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CREDIT VALLEY CONSERVATION REPORT 1957


SUMMARY

DEPARTMENT OF PLANNING & DEVELOPMENT



CREDIT RIVER WATERSHED





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Flowing through a well-wooded valley which is deeply entrenched below the level of the surrounding landscape, the west branch of the Credit River between Belfountain and the Forks presents many secluded reaches where trout lurk in the shaded pools.

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DEPARTMENT OF PLANNING AND DEVELOPMENT

HON. W. M. NICKLE, Q.C.
Minister

T. A. C. TYRRELL
Deputy Minister

A. H. RICHARDSON
Chief Conservation Engineer

CREDIT
VALLEY
CONSERVATION
REPORT
1957

SUMMARY



ONTARIO

TORONTO

Printed and Published by Baptist Johnston, Printer to the Queen's Most Excellent Majesty
1957

INTRODUCTION

With the advent of the new concept of personal and community responsibility in conservation, the Authorities movement was born, and the willingness of the people to undertake conservation work in this way is indicated by the fact that in the last 11 years 18 Authorities have been established, with a total membership of 287 municipalities and an area of 12,867 square miles.

The Credit Valley Conservation Authority was established by Order-in-Council on May 13, 1954, following an organization meeting which was held at Brampton on April 29, 1954, when 15 municipal representatives out of a total of 18 attended the meeting and 11 voted in favour of establishing the Authority. In February, 1955, the Authority was enlarged to include all the streams entering Lake Ontario in Toronto Township.

The Department of Planning and Development, as a service to an Authority, undertakes to carry out a conservation survey of the valley for the guidance of the Authority, but the commencement of conservation work in the valley does not necessarily have to wait until such a survey has been made and the report presented. This has been the case with the Credit Conservation Authority, and much excellent work and planning have been done independently of the reports which have been prepared by this department.

The Credit Valley Conservation Report 1956 covered the subjects of History, Land, Forests, Water, Wildlife and Recreation, and was presented to the Authority on May 23, 1956. Two hundred copies were mimeographed as a working plan for the Authority and other officials. A summary of this large volume for distribution to the people of the watershed is presented herewith.

—A. H. R.

Credit Valley Conservation Authority

Established May 13, 1954
(Enlarged February 17, 1955)

CHAIRMAN.....	A. M. GREENAWAY, Port Credit
VICE-CHAIRMAN.....	A. WHEELER, Hillsburgh
CHIEF OFFICER.....	A. H. RICHARDSON, P. Eng., Toronto
SECRETARY-TREASURER.....	W. ELMER WRIGHT, Port Credit
FIELD OFFICER.....	E. F. SUTTER, Brampton

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Amaranth Township.....	ALBERT E. BRYAN
Brampton Town.....	J. W. PAWLEY
Brampton Town.....	W. M. ROBINSON
Caledon Township.....	*T. W. GLASSFORD
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Erin Township.....	*ALBERT WHEELER
Erin Village.....	PETER J. SINCLAIR
Esquesing Township.....	CAMPBELL SINCLAIR
Garafraxa East Township.....	GEORGE I. NODWELL
Georgetown Town.....	ALEX MacLAREN
Mono Township.....	ERIC M. WHITE
Orangeville Town.....	W. M. CURRY
Port Credit Village.....	*A. M. GREENAWAY
Streetsville Village.....	*A. S. MENDELL
Toronto Township.....	*DOUGLAS A. PERIGOE
Toronto Township.....	MISS M. S. CASTLE
Trafalgar Township.....	FRED NEAR
Trafalgar Township.....	J. RYLANCE

*Member of Executive Committee.

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Recommendations

Stated or Implied in This Report

HISTORY

1. That, before carrying out any project, the Authority ascertain from the Royal Ontario Museum of Archaeology at Toronto whether the area concerned is likely to contain archaeological material and if necessary arrange for the investigation of the site before operations make this difficult or impossible.
2. That where records, buildings and objects exist of sufficient interest as illustrating the life of the watershed during the period of development, the preservation of these relics be considered an aspect of conservation; and that where such records and other relics are the private property of individuals and corporations within the watershed, the Authority take definite measures to encourage their preservation by their owners or their commitment to proper care in libraries, museums, archives and other suitable repositories.
3. That when sites, buildings or ruins of structures, of this kind form part of, or are adjacent to, properties acquired by the Authority for flood control, reforestation or recreation, the possibility of including them in the scheme be considered.
4. That in such cases sites be marked, ruins preserved and buildings restored and used for some purpose in connection with the project compatible with retaining their original character.
5. That the Authority appoint an Historical Sites Advisory Board to make recommendations to it with regard to matters of historical interest, including the preservation of historical buildings and relics.
6. That this selection include the sites of the Government House in Port Credit, of the Mississauga Mission Village, of all mills known for certain to have been built before 1830; of some later mills, factories and tanneries of particular interest and of some other buildings of historical interest which have disappeared; also the "Radical's Hole" at the Forks of the Credit; some early roads and trails; and some existing buildings interesting for their associations or age.

7. That from the large number of sites and buildings of historic interest (in the wider sense used in these recommendations) to be found within the watershed, a few be selected for eventual inclusion in the scope of the activities of the Authority, besides those connected with recommended projects.
8. That wherever possible, the buildings be left on their original sites and continued in their original use or adapted to some suitable purpose in connection with the normal life of the community.
9. That the Authority provide as part of its recreation program an area or areas where buildings which it is desired to preserve may be re-erected when they cannot be retained on the original site.
10. That all these recommendations be taken as applying with particular force to the Limehouse and Meadowvale-Churchville Conservation Areas as outlined in the Recreation Section of this Report, and to the areas around Cataract, Belfountain and the Forks.

LAND USE

11. That the Authority, through its Farm Planning and Land Use Advisory Board, set up demonstrations, or pilot farms, in several sections of the watershed in order to display and promote the various soil and water conservation measures, and the advantages of farm planning. These demonstrations might be carried out on private land in co-operation with the owners or on land acquired by the Authority.
12. That the individual farmer be made more aware of the effect on the flow and siltation of the river as a result of his use of his land; and the part that conservation measures can play in improving stream flow and stream conditions.
13. That the Authority keep in mind the fact that the pattern of land use within the watershed is changing and that in the best interests of the area this change should be directed, wherever possible, along lines which will be to the common good.
14. That the Authority take a lead in promoting the adjustment of land uses to the capability of the land.
15. That the Authority make full use of the technical assistance available from the various branches of Government in the solution of problems relating to the improvement of the land and water resources of the area; and that full co-operation be effected with groups such as the Soil and Crop Improvement Association in the promotion of the soil and water conservation program.

16. That the Authority carry out an extended and intensive program of publicity directed toward the improvement of land and water resources; and that appropriate literature relating to land improvement be obtained from the Department of Agriculture through the Agricultural Representatives for distribution to interested farmers; and that full use be made of the several O.A.C. films relating to farm improvement; and that the farmer be made more fully aware of the nature of soil and what happens to it under use.
17. That the Authority use, where feasible, parts of land acquired for other purposes, such as reforestation, for improved pasture demonstration.
18. That the Authority give serious attention to the reclamation and improvement of the areas of seriously eroded red clays in the vicinity of Cheltenham and Terra Cotta.
19. That the Authority give assistance to private owners, where possible, in the establishment of windbreaks and shelterbelts on the sandy lands subject to wind erosion.
20. That the Authority promote, as far as possible, the installation of drainage measures on the imperfectly and poorly drained soils of the Peel Plain and elsewhere, and the restriction of artificial drainage on the strategic headwater areas where drainage is possible or accomplished.

FORESTRY

21. That the Authority, under agreements with co-operators or through lease or purchase of suitable woodlots, undertake the development of Woodlot Improvement Projects to demonstrate the advantages of better forestry practice.
22. That a Credit Authority Forest be established and that it be expanded through a definite program of annual additions and planting until the total recommended area of 4,743 acres is acquired and reforested.
23. That the Authority encourage private reforestation by purchasing a tree-planter and providing a planting service at nominal cost on land suitable for machine planting, and by offering a planting subsidy where hand planting is necessary.
24. That the Authority, by purchase of equipment, organization of cutting crews, or direct subsidy, encourage private owners in thinnings and improvement cuttings in their woodlots.
25. (a) That the Authority investigate the Halton County fencing scheme, and adopt such a modified scheme as seems most likely to result in elimination of woodland grazing.

- (b) That the Authority publish a simple, attractive bulletin on the disadvantages of woodlot grazing.
- 26. That the Authority co-operate with schools, government departments, and all other groups and agencies possible to publicize the need and the methods of reforestation and woodlot management; and in particular that the Authority sponsor tours, practical demonstrations and field days for this purpose.
- 27. That the Authority act as co-sponsor for:
 - (a) 4-H Forestry Clubs;
 - (b) The Tree Farm movement.
- 28. That the Authority assist in investigating and publicizing markets and marketing methods for woodlot products to encourage:
 - (a) maximum use of low-grade materials from thinnings and improvement cuttings;
 - (b) closer and more uniform appraisal of timber, whether standing or in the log;
 - (c) marking of trees for removal;
 - (d) securing of competitive bids for timber;
 - (e) insistence on a written Timber Sales Contract.
- 29. That the Authority investigate and urge the implementation of the best method of providing fire protection for wooded areas within the watershed in co-operation with the Department of Lands and Forests.
- 30. That the Authority encourage the establishment of windbreaks, shelter belts and snow fences.

WATER

- 31. That mill ponds which are no longer used for power purposes be properly regulated or emptied during the winter months to prevent the formation of heavy ice sheets.
- 32. That abandoned encroachments such as old bridge piers, abutments and embankments be removed from the flood plains and river bed.
- 33. That, where practical, properties within the flood plains be expropriated and the lands retained for recreational purposes and that no further encroachments be permitted before being thoroughly investigated from the standpoint of flooding.
- 34. That the conservation measures outlined in the Land Use and Forestry sections be implemented to help moderate the extremes of river flow.

35. That local channel improvement work be carried out at Churchville, Meadowvale and Glen Williams without delay.
36. That the 5-day B.O.D. of tannery effluents be kept down permanently below 200.
37. That the settling basin for the Acton Tannery wastes be divided into six compartments and that the effluent be run into each in turn on succeeding days and that the remaining debris be raked off before any effluent is run into the section again.
38. That the dam holding the final effluent back from the river be reinforced to prevent it from collapsing and allowing the wastes to enter the river.
39. That refuse dumps along the streams be properly covered to prevent pollution of the streams during heavy rains and in the spring.
40. That sewage treatment plants be adequately designed to take care of the growing populations to prevent overloading and the subsequent polluting of the streams.
41. That the silt in wash water from gravel-washing plants be removed in settling basins before the water is returned to the river.
42. That the Orangeville and Cataract Reservoirs be considered for early construction at a cost of \$1,590,000.00.
43. That steps be taken to acquire lands for the Belfountain, Silver Creek, Glen Williams and Georgetown reservoir sites.
44. That a number of community ponds be constructed throughout the watershed, particularly those in or adjacent to proposed recreational areas, to provide added recreational facilities.

WILDLIFE

45. That the Authority urge the Department of Health to install a permit system for every new outlet (except agricultural tile drains) which leads into a watercourse.
46. That the Authority urge the Department of Health to set a time limit within which all municipalities, industries, gravel operators and home owners who now pollute a stream or streams must adequately treat their industrial or other wastes.
47. That the Authority carry out an extensive educational program concerning pollution.
48. That the Authority consider the possibility of acquiring, or at least urging the acquisition for the public, of a stretch of the river below Credit Forks for public fishing.

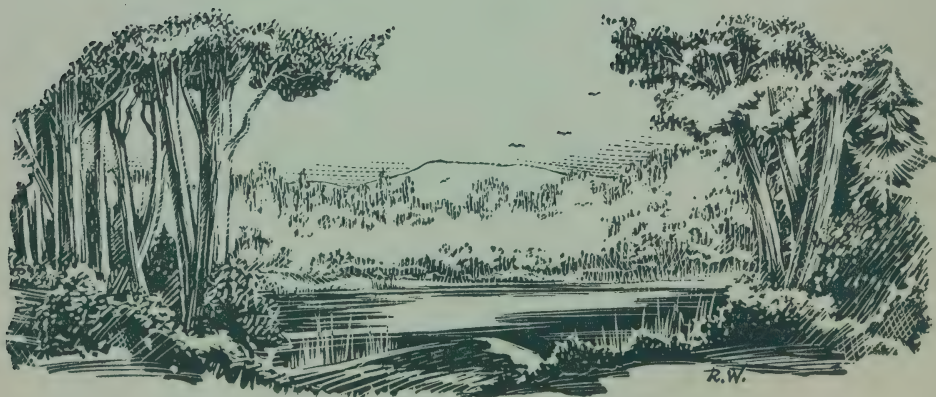
49. That the Authority encourage farmers to construct or improve farm ponds for fish.
50. That the Authority sponsor a demonstration of improvements of a trout stream.
51. That the introduction of fish into the watershed be restricted to those parts of the river shown to be suitable for the species concerned.

RECREATION

52. That the people of the Credit Valley be advised by the Authority of the exceptional recreational potential of the Credit Forks area, and of the great possibilities for the future of this area.
53. That the Authority establish four multiple-use Conservation Areas as follows:

Meadowvale-Churchville Conservation Area...	377 acres
Limehouse Conservation Area.....	315 acres
Terra Cotta Conservation Area.....	500 acres
North Caledon Conservation Area.....	550 acres

54. That the Authority establish and publicize a Scenic Route of 62 miles running from Lake Ontario to Orangeville.
55. That the Authority make agreements with landowners to establish public footpaths linking the conservation areas.





"TORONTO HOUSE" BUILT ABOUT 1820¹ BY
LIEUTENANT-COLONEL PETER ADAMSON.

I HISTORY

CHAPTER 1

THE FIRST INHABITANTS

In the southern part of Peel County evidence of the presence of prehistoric races called the Pre-Iroquoian has been found, but the archaeological map remains a blank between Sixteen-Mile Creek and the Etobicoke concerning occupation by historic tribes, such as the Petuns, Neutrals and Hurons.

Most of the earliest and best maps omitted the Credit altogether, though it does appear on Raffeix's map of 1688.

The Credit River, however, was important to the Mississaugas. They certainly frequented it during the eighteenth century and trading probably took place there before the building of the fort on the Humber. After 1760, unlicensed traders, who gave the commandant at Niagara so much trouble, preferred the Credit to the Humber, as the latter was likely to be visited by soldiers who would arrest them and confiscate their goods.

In 1792, after the formation of the Province of Upper Canada, the second Mississauga Purchase fixed the west boundary of the Mississauga Tract at a line running north-west from the opening of Burlington Bay. The short stretch of shoreline between here and Etobicoke Creek was now of great importance to the Mississaugas as their only foothold on Lake Ontario.

CHAPTER 2

THE APPROACH OF SETTLEMENT

The various purchases of the 1780's and '90's left the Mississauga Tract across the line of land communication between the settled areas of the Province. This became more important after York was founded as the new capital in 1793.

1. THE BEGINNING OF DUNDAS STREET

Two main Indian paths crossed the lower part of the Credit Watershed. One crossed the river near Erindale and the other near its mouth. Both had been used since 1710 by travellers going overland from Kingston to Niagara or Detroit.

Lieutenant-Governor Simcoe had a great road across the province to take the place of these footpaths. The first section was opened in 1793 as a portage road for waggons between Lake Ontario and the Upper Thames and called "Dundas Street". The line from York to Burlington Beach was marked in May, 1794, following the inland route and a sleigh road and bridle-path was opened by Augustus Jones and the Queen's Rangers in 1796. This had been improved into a wagon road by 1798 when the Lakeshore Road was opened. The frequent destruction of the bridges kept the inland road in use because on it the streams could be crossed by fords.

2. THE GOVERNMENT HOUSE AT THE CREDIT

Governor Simcoe had intended to build inns where the road crossed areas not yet opened to settlement. The first of these "Government Houses", a large inn called the "King's Head", was built in 1794 at the south end of Burlington Beach. Smaller inns were planned where the road crossed the Credit and Grand. These inns would provide shelter, food and fodder, and possibly relays of horses for couriers.

It was not until 1798, after Simcoe had left Upper Canada, that the actual order to build the inn at the Credit was given. The Government Offices had by then been moved to York. Partly for the convenience of boat traffic, the



The "Government House" at the Credit re-drawn from a sketch in Robertson's "Landmarks of Toronto" based on descriptions by the last owners—Destroyed 1861.



Near Erindale—this cottage, on Lot 33, S.D.S. granted to Peter Covenhoven (Conover) in 1806, is typical of the style of 1815-1825. Conover's Tavern was not far off and Conover's Brewery is typical of the style of 1815-1825. Conover's Tavern was not far off and Conover's Brewery stood a little to the east in 1859—stucco or roughcast on frame was considered warmer than clapboard.

Silverdale—This round-log house stood to the north of the sawmill around which grew the first village of "Sligo". Its size and central chimney suggest that it was built as a tavern. The house may date from before 1830.



inn was placed on the left bank of the river, near the mouth and a little south of the present bridge in Port Credit. This location was also near the Lakeshore Road. This Government House was not small by the standards of that time. Strongly built of squared timbers and possibly covered with clapboards from the first, it may have been 40 feet by 30 feet.

A list of Government Property in Upper Canada in 1799 gives some details of how the house was maintained:

“River Credit—a house was built at this place for the accommodation of travellers passing to and from the seat of government through the Mississauga Tract of land. This house is in the occupation of Mr. Allan, merchant, under a lease of one dollar per annum and an obligation to have it properly kept for the accommodation of travellers.”

Colonel William Allan, J.P., was a prominent merchant in York and soon (1801) to be appointed the town's first Collector of Customs. He never lived at the Credit and fulfilled his obligation through employees or sub-tenants.

Major Thomas Ingersoll petitioned in 1806 to lease the inn for seven years at \$2.00 a year, offering to put the house in good repair and to lath and plaster three of the rooms. He had been living at the Credit for about a year and had apparently taken over Allan's lease. He had evidently decided that the settlement of New Dundas Street would make the inn more profitable without immediately reducing the value of the trading post. It had been this that had chiefly interested Allan and his tenants; the profits from the inn must have been small before 1806.

His family continued to keep the inn for some years after Thomas Ingersoll died in 1812, but were gone from the Credit by 1816 or 1817. The house ceased to be used as an inn about 1840, after larger hotels had been built in Port Credit Village. In 1861 it was taken down and rebuilt on a farm. Two years later fire destroyed the timbers of the first inn on the Credit.

3. THE BEGINNING OF THE LAKESHORE ROAD

The Indian path along the lakeshore was used by travellers both before and after the opening of Dundas Street. It may have been possible to use it as a bridle path, but the first waggon road was opened by Government in the summer of 1798. This road was constantly in need of repair and there was trouble in keeping bridges over the Humber and Credit. The lease of the Humber ferry was renewed and we are told of one run by the tenant of the Government House at the Credit.

Wilmot does not show any bridge over the Credit on his map of 1806. He shows Dundas Street forking just after entering the Indian Reserve from the south-west, the right hand fork curving toward the lake, mostly to the west of the present Mississauga Road. The crossing was below the Government House. The old Lakeshore Road can be made out on this map. It ran much closer to the shore than the present highway which follows the Third Concession South.

4. THE FIRST PURCHASE, 1805

On the second of August, 1805, the Mississauga chiefs set their marks to a new treaty that ceded to the Crown for £1,000 sterling the lands along Lake Ontario between Etobicoke and Burlington Bay for a depth of between five and six miles from the shore.

“Reserving for ourselves and the Mississauga Nation the sole right of the Fisheries in the Twelve Mile Creek and the Sixteen Mile Creek, the Etobicoke River together with the flats or low ground on the said creeks which we have heretofore cultivated and where we have our camps and also the right of the Fishery in the River Credit and one mile on each side of the said river.”

This Purchase was reckoned to contain 84,000 acres, so the Indians were to receive less than 3 pence sterling an acre.

Lieutenant-Governor Hunter died within three weeks of the signing of this treaty. The new Administrator, Commodore Alexander Grant, suggested that the price be increased to £1,700. This suggestion was approved, but as the acreage proved to be much larger than had been supposed, the Indians did not get the full benefit of Grant's good intentions.

CHAPTER 3

THE OLD SURVEYS — 1806-16

Though there was delay in ratifying the treaty there was none in starting the survey or in granting lands in the Purchase. Three townships were to be laid out between the Etobicoke and Captain Brant's Grant. It was at first proposed to call these “Toronto”, “Alexander” and “Grant”, but when the news of Nelson's victory and death reached York the last two names were changed to “Trafalgar” and “Nelson”. The name “Toronto” may have been due to the old error of certain maps that showed a “Fort Toronto” near the Credit.

The new Dundas Street was laid out like Yonge Street as a straight settlement road with concessions fronting it to north and south. There were two concessions north of Dundas Street and three or more to the south according to the trend of the lakeshore. Since 1818 these sections of Toronto, Trafalgar and Nelson Townships have been known as the “Old Surveys”. The survey was carried out by Samuel Street Wilmot in the first half of 1806 and finished before June 28th.

Thomas Ridout, Principal Clerk in the Surveyor-General's office, wrote to the President of the Legislative Council on July 29th, 1806, “that only Twelve whole Lots, remain unlocated throughout Dundas Street, including both sides of the communication”, in the Tract.

That the lots were located so quickly shows the demand for good locations in the Home District and the lack of grantable lots near the lake or the main

highways. Grantees who did not wish to occupy in person knew that they might sell at a high price to an actual settler soon after getting their patents.

The majority of the grantees were Loyalists and their children from the Niagara District but other groups were also represented. Some intended to become permanent settlers at once; others were willing to do so when they had sold their improved farms elsewhere. All, however, had first to complete their duties to clear their title. A few years before, this would have troubled absentee owners very little. Their grants had sometimes been free of these duties and except on Yonge Street and a few other locations almost no attempt had been made before 1798 to find out what settlers were doing to improve their holdings. Yearly inspections of Yonge Street had shown much slackness and threats of forfeiture had been uttered in 1798, but very few lots had been declared vacant for nonperformance. Fees did not have to be paid until the patent was applied for and many lots were held for years and assigned more than once on the strength of a recommendation from the Land Board and an entry on the Surveyor-General's map.

Peter Hunter on his arrival had determined to change this and soon succeeded in frightening the dilatory grantees as much as he had the sluggish officials. From 1800 to 1804 more and more owners, often residents for five to ten years, were sending in their certificates, paying their fees and getting their patents. In 1804 General Hunter ordered fees to be paid within three days of the date of the location ticket. This removed another reason for delay in patenting at the expense of some hardship to settlers who were short of cash.

The relatively small population of Toronto Township was a result of the large number of reserves in the back concessions. In all three townships the Crown and Clergy Reserves omitted on Dundas Street had to be made up in these concessions and in Toronto Township the lots marked for Masting were still unoccupied unless by squatters. Very few Reserves had been leased; there was less demand for lots in these concessions and both reserved and unreserved lots were available after 1812.

These settlers of 1810 to 1812 were probably fairly representative of the community that stretched along Dundas Street at the outbreak of war. It was still a primitive, frontier settlement. The clearings had grown a little every year as new pieces were cleared for the next year's wheat crop. The half-cleared strip through which the highway had run in 1809 was now a nearly continuous opening in the woods, 266 feet wide. The fenced fields would extend in some places more than a quarter of a mile from the road allowance. They were interrupted at intervals by patches of swamp or gullies left uncleared and fairly often by farms where the house stood empty and the first small clearing was running back to brush. There were no reserves to make long stretches of wood, but some residents had been buying more land than they could expect to farm or let on shares and not all the absentees could find tenants.

The settlers along Dundas Street had a blacksmith from the first and soon there were other taverns besides Cody's at Dixie and Samuel Covenhoven's (or Conover's) near the Trafalgar Townline. The highways had the additional

advantage for the settlers of making it easier to maintain such establishments and giving them some local market for produce. The Credit River, on the other hand, did not play the normal part in the life of the settlement. It provided a sheltered landing for boats, but they were debarred from using its waterpower for mills and up to 1812 had to depend on the Humber grist mills, though Daniel Harris may have built his sawmill near "Harrisville" (Cooksville) before the war. Later, grist mills were built on the Etobicoke and the Sixteen-Mile Creek. Strictly speaking, the settlers were barred from hunting in the reserve or fishing for salmon. There can be no doubt that they did both, as well as trading with the Indians for salmon, venison and maple sugar and deerskins, all of which came chiefly from the Credit Valley.

The war brought a greatly increased traffic along the highways that eventually led to improvements to Dundas Street; it meant a great rise in the price of all farm produce and far more cash in circulation than ever before. Probably the great demand for flour was partly responsible for the building of grist mills on the Sixteen and of the Silverthorn Mill at Summerville. The interruptions of water traffic by enemy forces on the lake was a further encouragement. The absence of most of the younger men on military duty for periods of varying length must have disturbed the life of the settlement and there were doubtless alarms when armed boats appeared offshore. The actual fighting came no nearer than the Humber, but some of the men took part in hard fighting. Their services were eventually to be rewarded by grants in the new Purchase. There was probably some ill-feeling between neighbours. Some settlers were in sympathy with the enemy, though few seem to have forfeited their lands by leaving during the war.

When the war ended the Old Survey was considerably more advanced than it had been in 1812, though the number of inhabitants was probably not much greater. Within a few years it became the base from which settlement moved into the New Purchase. In this settlement members of the established families on Dundas Street played a large part. They moved into the new area as actual settlers or received militia grants.

Until they were established they depended on the mills, smithies, tanneries and stores of the Old Surveys for much of the supplies and services that they could not provide themselves.

CHAPTER 4

THE SETTLING OF THE NEW PURCHASE

1. THE TREATIES OF 1818

Settlement was at a standstill during the war, but after 1815 there began a great movement of immigrants into Canada that was to grow steadily until after the middle of the century.

To provide land for this settlement a number of purchase treaties were negotiated in 1818-25 that added huge tracts to the ungranted Crown Lands.

The provisional treaty by which the Mississaugas "inhabiting the river Credit, twelve and sixteen mile Creeks" surrendered the remainder of their tract, was signed on October 28, 1818. A treaty with the Chippewas to the north-west, signed in the same year, gave the Crown title to a large area containing the small remainder of the Credit Watershed. No lands or fisheries were reserved for the Indians in the New Purchase and as they soon surrendered most of the old reserve, the Credit was available to the settlers both for fishing and for waterpower.

2. SURVEYS AND LOCATIONS

Petitions for land in the Mississauga Tract began to be received and approved as soon as it was known that a purchase was intended. Until surveys were completed such assignments could not be definite.

Grants were made on the assumption that the new surveys of Toronto, Trafalgar and Nelson would be carried out on the same plan as the old. Evidently other townships had been laid out on paper and named before 1819. Nassagaweya, Esquesing and Chinguacousy were named in the belief that these were "the Indian names of the principal Rivers in each respectively".

When it was decided to adopt a new type of survey, these grants had to be revised. Concessions were now to run nearly at right-angles to Dundas Street and to be divided into nearly square farms of 100 acres, two to a lot.

3. ACTUAL SETTLEMENT: 1819-39

One family was living in the New Survey of Toronto Township before the end of 1818. The first regular location tickets were issued about May 1, 1819, after the survey was completed. Some settlers moved in at once and began their clearings.

They were members of a group of Irish settlers from the United States for whom a block of land had been reserved and who had been waiting in York or the Old Survey for their locations. A party of "about twenty-six families" with a train of twenty-six waggons are said to have made the difficult spring journey from New York, arriving about the middle of April. Other families probably came direct from Ireland a few weeks later. In all there may have been forty or fifty families in the New Survey when Chinguacousy was opened in September, 1819.

The survey contractors drew the lots they received in payment, but it is not clear whether ordinary grantees were able to choose their locations. There are references to a draught, but notices of lots in Chinguacousy say nothing of it.

James McNabb of Dundas Street was allowed to place a group of Scottish settlers in the "Scotch Block" in Esquesing and others in Caledon. The greater proportion of the grantees in Esquesing were "yeomen" from townships of the Niagara Peninsula. There were similar grants in the other townships. In the first few years the proportion of Canadian settlers was high in parts of Esquesing, Erin and in the part of Chinguacousy drained by the Credit.

The number of occupied holdings was small compared to the number granted by 1821. About one location in four in Esquesing was occupied by a family, about one four or five in Chinguacousy and only about one in fourteen in Caledon. If the proportion in Erin was the same as in Caledon, there were about eight households in the southern part in 1821.

The assessment rolls give the populations of the following townships. The figure for Toronto Township includes both surveys.

TOWNSHIP	POPULATION
	1821
Toronto.....	803
Esquesing.....	424
Chinguacousy.....	412
Caledon.....	100

A second movement of settlers into the Credit area began about 1826 and the number of new arrivals grew steadily in the next seven years. Land had now to be leased or purchased; it could no longer be obtained directly by grant to ordinary settlers.

The older settlements in Caledon near Star, Silver Creek and Rockside were expanding and new ones were forming near Belfountain and Alton, where children of Loyalists and some veterans occupied their holdings by about 1830. It was in the late twenties also that settlement began in the vicinity of Orangeville. In 1835 the population of Caledon was 1,414, fairly evenly distributed to east and west of the Centre Road but less evenly through the concessions. Erin contained 75 households in 1830, totalling 368 persons. In the next five years new arrivals brought the population to 963.

In the more accessible parts of the watershed this process was still more rapid. The population of Toronto Township in 1835 was well over 4,000 and it was the third largest in the Home District, ranking after York and Markham Townships. Settlement in the New Survey had greatly increased after 1821, especially in the late twenties when the villages were coming into being. After 1830 the village population grew still more quickly and by 1835 it may have accounted for nearly a fifth of the total. Apart from this the township was among the more populous areas in Upper Canada and the concessions west of the Centre Road were probably the most thickly settled part of the township. Chinguacousy and Esquesing, with populations of 2,428 and 2,206, were far from being fully occupied, but they were as populous as several longer-settled townships. There was little village population in either. In Chinguacousy the section drained by the Credit was probably about as well settled as any other. There had been fewer absentee holdings to restrict settlement in the 1820's, and the fine farmland had been quickly occupied. This left less room for newcomers after 1830 and the rate of increase was slower. In the northern part of Esquesing there was far less land of this type, but after 1826 developments to the north and north-west of the watershed began to stimulate the development of this township.

The Canada Company had disposed of most of its holdings in the Credit Watershed by 1837. In December, 1840, a return was made of immigrant settlers in thirty-eight townships who had completed purchases from the Company. Erin was not included among these townships. The figures for the others in the Credit area are given in the grouping used in the return.

<i>Township</i>	<i>No capital</i>	<i>£20 or less</i>	<i>£20 or more</i>	<i>Total</i>
Chinguacousy.....	24	19	18	61
Esquesing.....	27	2	7	36
Caledon.....	26	6	4	36
Toronto.....	2	2

The Company only evicted an occupant as a last resort, but some parcels in Erin seem to have come back on its hands and were still unsold in 1859.

The Crown Reserves were now as readily available as any other land in the area. A considerable number of Clergy Reserves had been leased in the early 1830's and were occupied in 1837. Very few had been sold by that year, but the interruption of settlement by the reserves was much less than it had been before 1830. The great immigration of 1830-34 had done much to advance the development of the Credit area, but in 1835 immigration in Upper Canada dropped sharply and suddenly and culminated in the depression of 1837.

CHAPTER 5

CHANGES IN THE OLD SURVEY

While the New Survey was rapidly changing from a wilderness to a settled countryside, change was also taking place in the Old Surveys. Except along Dundas Street this did not involve a rapid increase in the degree of settlement. There were already some large holdings in the area by 1812, the result of the buying and exchanging.

A good deal of land changed hands between 1818 and 1830 and some two-hundred-acre farms were broken into smaller parcels. But as a rule these sales tended to throw parts of several holdings into one large one. The average holding in Toronto, Old Survey, in 1835, seems to have been nearly 190 acres, although there were several farms of less than fifty acres and still smaller parcels in the villages.

There was now almost no vacant Crown Land in the Old Surveys, especially near the Credit. Most of the reserves had been occupied before 1818 and the few vacant lots taken up, including land forfeited during the war. The situation was a very good one and prices were high. The area was attracting the type of purchaser who wished to acquire a large tract and with so much land available in the New Purchase there was less division of holdings among several heirs.

Inns multiplied along Dundas Street; new industries were set up, stores, sawmills, tanneries, a distillery and a brewery. Around the old taverns, where trails led northward into the New Survey, the hamlets began to grow into villages. The Government took steps to make the waterpower of the Credit available for mills and to found villages on the river. In 1820 the Mississaugas surrendered all but 200 acres of their reserve on the Credit, to be sold by the Crown, partly for their benefit and partly to defray the cost of roads through the Indian tracts. The reserve was surveyed in three blocks. The centre block (E) on each side of Dundas Street was to be sold at once to pay for the roads and was laid out "in Lots of Fifty Acres and a Village".

The area was now beginning to attract a type of settler who was to become more common in Upper Canada after 1830. They were immigrants of ample means who came to Upper Canada seeking estates rather than farms. Their capital was usually much larger than that of the average well-to-do settler, and if they were prudent they spent some of this on improved land in a settled area for their home farm, though they might take a good deal of bush land in addition as a speculation or to provide the income from rents which was part of their scheme of existence.

The opening of Block F did not produce much settlement near the river. Most of the other lots went to inhabitants of Springfield and Dundas Street. They were occupied very gradually, but some householders are listed in 1837 and some other sawmills may have been built before 1840. It was probably intended to sell Block D, between Racey's tract and the lake, in the same way, but in 1825 it was decided to settle the Mississauga Indians in this area.

Tenders for building houses for the Indians were called for in the fall of 1825. They were dressed log cottages with two rooms, of the type built as a second house by settlers who had been five to ten years on their farms. Most families had only one room, but the chief's house had at least two rooms downstairs and a half-storey above. The house built for John Jones, who went with the Indians as schoolmaster, was probably of this type and the one built later for the missionary may have been larger. Peter Jones probably shared John's house when at the Credit and it was there that he began his translation of the Gospels into Ojibway. Egerton Ryerson lodged with John Jones during his short term as a missionary at the Credit.

Ryerson accomplished a great deal during his time at the Credit. He threw himself into the work of clearing and of teaching the Mississaugas everything connected with a settled life, from building fences to cooking. In less than a year he learned enough Ojibway to be able to preach to his charges in their own language.

Later the Government built a sawmill for the Indians; a separate chapel was built and various crafts were started in addition to farming. The village had been located on the high ground south of the Credit, not on the 200-acre reserve on the flats, which was subject to flooding. A village plot with intersecting streets had been laid out, just beyond the point where the Mississauga Road bends to the south-west, near the Mississauga Golf Club. However, all



Erindale—this cottage on the old highway at the eastern end of the village, probably dates from the first ten years of Springfield's existence. It was long occupied by Dr. Dixie whose surgery with its fittings remained until recently in one of the rooms.

From Tremaine's Map of Peel County, 1858—This Stage House of the 1830's stood between Dundas Street and the millrace where "Jarvis Street" led to the grist mill. The Magrath homestead, "Erindale House" shows among the trees above the drivesheds.



EXCHANGE HOTEL.

Emerson Taylor Proprietor, Springfield



St. Peter's Anglican Church, Erindale—the fine stone church of 1887 that replaced the frame one built fifty years earlier.

the buildings seem to have been along the road. In 1837 there were about fifty of the two-family houses. In 1840 they had about 500 acres cleared and under cultivation. From the end of 1827, when James Richardson Jr. succeeded Egerton Ryerson, there was usually a white missionary living at the Credit. Richardson was followed by George Ryerson, whose wife died at the Credit in July, 1829.

The experiment had been a success in many ways, but no devotion on the part of the missionaries could check the ravages of disease.

The surviving Mississaugas were allowed to return to their old home on the Grand or to move to Munsey or other missions. For years their houses remained standing along the road. They disappeared one by one until only the chief's house remained on the Golf Club grounds as a memorial to the Mississaugas of the Credit and even this relic seems to have perished in recent years.

CHAPTER 6

THE REBELLION OF 1837

Ever since the end of the war dissatisfaction with the management of affairs in Canada had been growing. The causes went back in most cases to the early days of the Province and were chiefly connected with the distribution of land, the lack of roads and schools, the management of the reserves and the tendency to give the Church of England a privileged position in regard to marriage, education and the revenue from the Clergy Reserves.

The Home Government had shown some readiness to listen to the complaints of inhabitants. They had, by 1830, reformed the system of land grants; got rid of the leasehold system in connection with the Crown Reserves and tried to do so in connection with the Clergy Reserves; forced the Legislature to accept the tax on wild lands and to widen the basis of representation by the formation of new constituencies. A system of common schools, partly supported by Government, had been established in 1816 and a number of schools had been opened. A considerable amount of money had been spent on roads, bridges and canals and still more was to be spent in the next few years.

The rapid growth of population in the early thirties seemed likely to solve some of the country's problems and it increased the power which the Reform Party had been steadily gaining in the Legislative Assembly. The party had found able leaders among both the old and the new settlers. The most violent and vocal was William Lyon Mackenzie, who had come from Scotland in 1820. He was sincere in his desire for reform and fearless in attacking abuses. But he was excitable and unstable, though his polemics against the Family Compact lost nothing in effect by being violent, exaggerated and occasionally untrue. He was skilful in taking advantage of the stupidity of his opponents who frequently played into his hands by equally violent actions and abuse.

The Reformers had a considerable following in the Mississauga Tract, particularly in the Second Riding of York County, which corresponded closely to the present Peel County. They had adherents and opponents in every group and class. The Second Riding had usually elected Reformers during the twenties and early thirties. Mackenzie himself was elected for this riding in 1829. Mackenzie had some warm supporters in and around Streetsville and Churchville. On the other hand many of the North of Ireland settlers in Toronto and Chinguacousy were Orangemen, and usually strong supporters of the Government. This did not prevent some of them from favouring reform, but prevented them from giving unqualified support to Mackenzie and the extreme group. Settlers with American connections were apt to be extreme Radicals and to advocate separation from the Empire and sometimes union with the United States. As a result the loyalty of the party became more and more suspect.

A large proportion of the settlers in Caledon were strong adherents of Mackenzie and his group. There were equally strong Tories in the township. During the thirties a local feud was carried on in this township, the larger group using the limited powers of the "Town Meeting" against their political opponents in matters of fences, cattle pounding and so forth. The Radicals had supporters in the Scotch Block of Esquesing and in Erin. With such a division of opinion in a primitive community clashes could be expected and as party feeling grew stronger in the late 1830's faction fights became common. The first is said to have occurred at Streetsville in 1833. A Reform banquet had been arranged at "Mother Hyde's" Inn and just as the company was about to sit down and while, it is said, Malcolm McKinnon was saying a Gaelic grace, a party of Orangemen broke in, drove out the Radicals and ate up the feast in spite of all Mrs. Hyde could say or do.

A more serious riot is recorded at "Coles Corners" in 1836. The events were typical of what went on in many other places. It was described by the Radicals as "an Orange outrage", but this account comes from Mackenzie's own "Advocate". It may be questioned whether Mackenzie's friends were quite so quiet or the Orangemen such bandits as is represented.

By autumn the Radicals were drilling more or less openly and some of the inner circle were planning to change the demonstration into a rebellion. They were badly supplied with arms, and blacksmiths in Caledon and elsewhere began to forge heads for pikes, an obsolete weapon, useful against cavalry but awkward against infantry armed with muskets and bayonets. At this point Bond Head sent the regular troops in the Province to assist in putting down the rebellion in Lower Canada. This left six thousand stand of arms almost unguarded at Toronto.

The possibility of seizing these arms with the capital city tempted the Radical leaders into hastening their preparations and calling for the concentration of December, 1837, which ended in the disastrous attack on Toronto and the defeat at Montgomery's Tavern.

Mackenzie fled westwards from Montgomery's Tavern determining to make his way to the United States as quickly as possible. Some of the local rebels

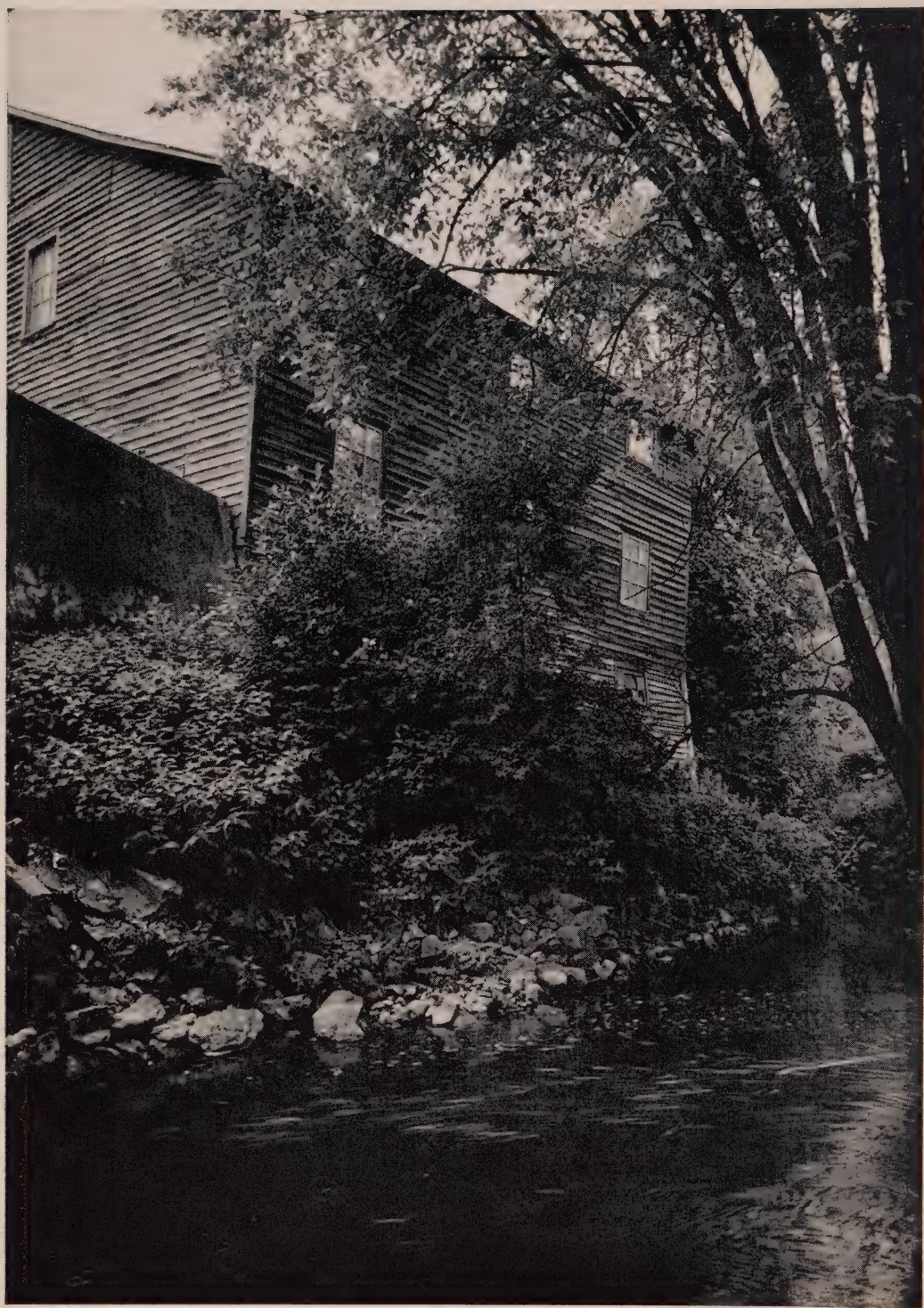
Streetsville — Timothy Street's house, 1825, said to be the first brick house in the Township. This long, low building resembles houses built before 1812 more than those of the 1820's. The bricks will have been burnt locally by itinerant brick makers. The porch is modern.



From Tremaine's Map of Peel County, 1859—To make the building appear more imposing the artist has reduced his figures to dwarfs. The main part still stands at Main and Queen Streets, with modern store fronts on the ground floor. A trellis gallery above heavy pillars was not uncommon in the 1850's.

Barber Brothers built their large stone woollen-mill and brick store south of Streetsville in 1853. Additions were made to both buildings at various dates, but the two-storied front of the store is little altered since 1859. It was here that William Lyon Mackenzie took refuge with the miller, William Comfort, in 1837 when escaping from the fight at Montgomery's Tavern.





Alton—the grist mill from the river—still in use as a chop mill. This is the lower type of frame grist mill usual before 1845. It may well be the first grist mill, built about 1851.

also fled to the States and others took to the hills where hiding out was comparatively easy. A number were concealed in the cave near the Forks which in 1869 was known as the "Radical's Hole". They were fed by sympathizers until the amnesty of 1838 allowed them to return to their homes.

CHAPTER 7

MILLS ON THE CREDIT

1. SAWMILLS AND GRIST MILLS

The Indian reserve on the Credit prevented any mills being built on the main river before 1820. At first the settlers in the Old Survey had to depend on grist mills on the Humber and the Sixteen-Mile Creek, but by 1818 there were mills on the Etobicoke at Summerville.

The first settlers in the new townships were likely to suffer more from the lack of mills. The Council was aware of this and tried to ensure that mills would be built soon after the settlers began to go to their land. Surveyors were instructed to report any millseats they met with in running their lines. To ensure that they were not held as a speculation, the Land Boards were ordered in January, 1819, not to locate lots containing millseats until security had been given for the erection of mills.

Tradition has placed the building of the Church sawmill, on the site of Churchville, in 1818. A more likely date is 1819-20. This would still make the Church sawmill the first in the New Survey.

SOME MILLS ON THE CREDIT — 1825

As listed by T. Street, Jan. 4, 1826
in evidence given before a Committee on Milldams

<i>Name of Dam</i>	<i>Location of Mills</i>	<i>Probable type of Mills</i>
"Mr. Racey's"	Erindale	Saw and Grist
"Comfort's"	Lot 1, Con. IV, W.C.R., Toronto Township	Saw and (?) Grist
T. Street's	Streetsville	Saw and Grist "and other machinery"
"Row's"	Lot 7, Con. IV, W.C.R., Toronto Township	(?) Saw
"Mr. Beattie's"	Lot II, Con. III, W.C.R., Toronto Township	Saw (?) and Grist
"Densmore's"	Near Churchville	(?) Saw
"Walker's"	Lot 3, Con. IV, W.C.R., Chinguacousy Township	Saw (?) and Grist
"M'Nabb's"	Norval	Saw and Grist

Timothy Street mentioned several dams between McNabb's and the Falls, which he calls the end of the salmon run. One of these was Charles Williams' (1825) at Glen Williams, another William Frank's at Belfountain also said to date from 1825. Matthew Crooks had built a sawmill at the Falls about 1822. It was probably running in 1826. The first Haynes mill at Cheltenham seems to date from 1827.

W. H. Smith in his "Canadian Gazetteer" of 1846 remarks that the number of new mills built on the river "in the last three years" had materially damaged the salmon fishing. Some of the "new" mills of which Smith was told were actually replacements of old ones. The sawdust from these mills was probably having an effect on the fish. The only figures available for this period are assessment and census returns for whole townships. In Caledon and Garafraxa all mills returned up to 1852 were on the Credit. So were all water mills in Chinguacousy after 1840, for the small grist mill built on the Etobicoke at Brampton had a short existence. From the information available the following estimates have been made of the grist and sawmills on the Credit in 1845, 1848, 1850 and at the time of the 1851-52 Census of Canada. They can only be regarded as approximate and include only the mills returned. The returns themselves may not be accurate, but are close enough to illustrate the trend.

Township	1845		1848		1850		1851-52	
	Grist	Saw	Grist	Saw	Grist	Saw	Grist	Saw
Toronto.....	4	15	5	6	6	12	9	13
Chinguacousy.....	1	7	2	6	1	7	2	8
Esquesing.....	4	9	5	14	3	8	6	9
Caledon.....	3	1	3	5	3	2	4	4
Erin.....	1	2	1	2	1	2	1	2
Garafraxa.....	1	2	1	2	1	2	1	2
	14	36	17	35	15	33	23	38



The mills shown on Tremaine's Map, with those in the other counties on the Credit, are tabulated below by townships.

MILLS — 1858-59

Township	Sawmills	Steam S.M.	Flour or Grist
Toronto.....	10	..	7
Chinguacousy.....	10	2	2
Esquesing.....	18	1	6
Caledon.....	13	1	5
Erin.....	3	..	4
Garafraxa.....	3	..	2
	57	4	26

Sawyers were no longer dependent on water power. By 1860 a good deal of the lumber cut in the watershed was sawn by steam power. Later some other large permanent steam sawmills were built in the watershed and water-power was frequently supplemented by steam. When really portable steam sawmills came into use after 1880 the connection of lumbering with the river was further weakened. Lumbermen had already ceased to depend on the Credit for transporting either their raw material or their products. This made it possible to continue sawmilling in the lower part of the watershed, while at the same time it encouraged the building of mills in Caledon and other areas above Georgetown. It is unlikely that the number of water sawmills on the Credit ever passed 60 at any one time or that the total of sawmills was more than 65. While new mills were being built on the upper streams, old ones were being given up farther down. The total number in 1880 was already below that of 1860. After 1900 the lumber mills were very few.

(a) TANNING AND LEATHERWORKING

Tanning was one of the first industries to be established in the Credit area. The Robinette tannery near Dixie may date from before 1820. Timothy Street evidently preferred to call himself a saddler, but it is likely that he was also a tanner and currier and that the "other machinery" attached to his mills in 1825 was used in connection with the tanning of leather. However, "Francis Motherill" is the only "tanner and courier (sic)" listed by Walton in Streetsville in 1837. Richard Poynter's tannery at Churchville is said to date from 1830; there was one at Georgetown about 1838, and the tannery at Norval may also date from before 1840.

The first tannery at Acton was opened in 1842. New ones were built before 1850 at Stewartown, Erin, Churchville, Glen Williams and Georgetown. The second tannery at Churchville seems to have been closed by 1851, but one had been built at Belfountain. The number in the watershed in 1851 seems to have been about ten. The highest total in the area (including the Cooksville tannery) seems to have been about 15-16 in 1865-67. A new tannery was built at Alton in the sixties, but by 1901 none were returned for "Cardwell County" in which Caledon was included for electoral and census purposes from 1871-1901; there was only one in the reduced County of Peel.

In Halton County tanning and leather-working remained important industries when they were declining in other parts of the area. In 1891 there were ten plants in the county, about seven being in the watershed. Twenty years later four firms in the county were turning out tanned leather and four, "gloves and Mittens". Waterpower had largely been given up by 1870, but the connection of the tanneries with the river remained fairly close and still raises some problems in the disposal of wastes. The Beardmore plant is still the chief industry of Acton, but most of the others have disappeared, some fairly recently.

(b) WOOLLEN MILLS

There seem to have been only two woollen mills in 1837, and one, Barber Brothers' at Georgetown, was still very new. Joseph McCrary's dyeing and cloth-dressing establishment at Streetsville may have been built some years before 1837. It was replaced before 1846 by Hiram Caslor's "woollen factory" which included a carding machine. The first woollen mill at Glen Williams was built by Jacob Williams in 1839.

From this beginning of three carding mills before 1840, there had developed within fifteen years a woollen industry of some importance. Barbers' mill at Georgetown had, by 1848, become a cloth factory employing forty hands.

In 1853 Barber Bros. built their four-storeyed stone mill below Streetsville and moved there the machinery from their mill near Georgetown. Another woollen mill seems to have been built in Georgetown in the 1850's and the McClure woollen factory was built at Alton in 1857-58.

The total in 1859 was about 10 woollen mills and of these about seven or eight were weaving cloth. The number of mills fluctuated after 1850. Some carding mills were closed, but one or two new ones may have been built. The number of woollen factories steadily increased until there were about fifteen to eighteen on the Credit in 1881.

By 1891 several woollen mills had closed down. There had been more specialization and some mills were producing knit goods by 1900. Of the seven or eight plants in the area in 1955, most are knitting mills and only a few produce yarn or cloth. Most of these plants are in the same places as old mills, but not always on the same sites, and in few cases has there been much continuity of ownership.

(c) WOODWORKING

Apart from the sawmills, the industries using wood as their principal raw material were, when taken together, the most important in the watershed. The most notable were the cooperages and stave mills; the shingle and lath mills; the carriage and waggon factories and the cabinet, chair and turning factories.

There is reason to think that one of the coopers in Streetsville was employing several hands before 1840 and the two cooperages at Churchville were evidently large establishments before 1845. There were cooperages in all the larger villages and the number of good-sized plants must have been greatest about 1867, though none were returned in the 1861 Census and very few in 1871. There is a steady increase in the number of cooperages returned until 1891, but actually the total number must have been less than in 1861. The stave and barrel trade practically disappeared from the area in the 1890's.

The making of shingles and lath was mechanized in the forties, but Rowe's shingle mill at Churchville is the first one mentioned in the area. The attempt to revive it after the fire in June, 1854, appears to have failed, but there was a shingle-maker in the village in 1869-71. Shingle mills were operating at Acton and Glen Williams in 1858 and these may have been founded, like Rowe's, soon after 1850. It was in this upper part of the watershed that shinglemaking was important.

The 1871 Census gives 99 shingle mills in Cardwell County and 17 in Halton. It seems likely that more than nine or ten of these mills were in the Credit area.

The only large mill on the lower watershed at this time was at Huttonsville, though there were shinglemakers at Campbell's Cross and Cooksville. Milled lath replaced the older "accordion" lath about 1865. A great many trees of small girth were consumed by the lath mills, but these mills were not many in the Credit area. Both shinglemaking and lath milling were ended in this area by 1900, perhaps because the raw material was exhausted.

The making of waggons and carriages was a major industry from the 1840's. For about fifty years it must have given employment to a great many of the inhabitants. By 1850 factories were to be found in most villages of any size in addition to the smaller shops. These factories varied greatly in size, but before 1860 there were some fairly large ones in the area. The improvement of the roads had brought a much greater demand for all sorts of carriages and increased the demand for waggons and coaches. By 1870 the industry was even more widely dispersed. There were factories in many smaller villages and hamlets. The Census of 1871 gives 25 carriage factories in Halton County, 23 in Peel and 20 in Cardwell. As Peel then consisted (for electoral and census purposes) of only Toronto, Chinguacousy and Toronto Gore Townships, the number of factories there was greater in proportion than in Halton. The numbers are not much less in 1891.

Cabinetmaking was one of the first trades to be established at Streetsville and we are told of fine maple furniture made at Streetsville before 1840. To cater to these factories and to the carriage and implement makers, turning mills were set up in several villages—Springfield, Cataract, Erin and Huttonsville among others.

The fashion for turned furniture began to die out after 1870 and the chair factories disappeared or were absorbed by cabinet factories. Some of the latter, like the two at Cheltenham, were of some size, but competition from larger plants outside the area was already severe and cabinetmaking did not become an established industry on the Credit to the extent that it did in some other parts of Ontario.

With the turneries may be placed the pump factories that had some importance at Glen Williams and Ballinafad from 1860 to 1890 and the special trades, such as Church's "peg and last factory" at Cataract and the "peg" and "bobbin" factories at Glen Williams. These supplied the local makers of boots and shoes and the woollen mills. The bobbin factory had become a lath mill by 1877. Meadows Brock made "dulcimers" at his cabinet shop south of Belfountain (later in the village) in 1859 and organs were made at Georgetown a little later. There were some other makers of musical instruments in the area and the presence of a "reed-maker" in Orangeville in 1857 suggests that the industry was already developed at that time.

The building of boats and small vessels began at Port Credit with Daniel Harris' boat in the early days of settlement and continued intermittently until after 1870. There were two ship builders and a boat builder in 1857, but only one ship-carpenter is listed twelve years later. The trade never was very large and it declined with the decline in lake shipping before the end of the century.

(d) PAPERMAKING

Barber Brothers established their paper mill near Georgetown about 1853 and since that time papermaking has been one of the principal industries of the town. Except for a brief period around 1869, when a second "paper manufacturer" (Richard Baxendale) is listed in Georgetown, there seems to have been only one paper mill in the area. The original stone mill is still the property of the company, but the actual manufacture is now carried on at a newer mill in Georgetown near the railway. Until late in the last century papermaking here had little connection with the lumbering. The raw material was linen rags or flax. Linen was little used in Upper Canada in 1850 and the papermakers were encouraging the farmers to grow flax. This had some effect on the agriculture of the area particularly the northern part. There was a flax-mill at Cataract in the sixties and seventies, but it seems to have been the only one on the Credit.

(e) QUARRYING AND LIME

Stone was quarried in the bed of the Credit at least as early as the 1820's and one or two buildings in the Old Survey, such as Toronto House and the church at Dixie, show that stone was sometimes used for more than foundations and

Barber Brothers' paper mill, Georgetown. The Barbers built their first mills at Georgetown about 1837, but it was in the fifties that they converted their woollen factory into the Credit Paper Mill, after moving a large part of the woollen business to Streetsville. The central stone building housed the paper mill in 1859. James Barber's mansion on the hill to the right was new at that time. The paper mill has been moved nearer the railway.



Huttonsville—the mills and millrace. The buildings in the background stand on the site of Brown's mills of 1848 and Hutton's large saw, lath, shingle mills of 1855. The brick woollen mill was built in the 1880's.



Cheltenham—the mills—Charles Haines' small log mill of 1827 stood near this site. Larger mills were built about twenty years later and there have been more recent alterations.





Orangeville, 1955—Three of the five or six hotels that once stood on the south side of the principal street. The only one still used for this purpose was refronted in the 1880's. The inn beside it (right centre) had triple galleries and dates from the 1850's. Another in the foreground has the curved lintels and cast-iron balconies of the 1860's, but the height of the front was increased somewhat later.



WILLIAM CAMPBELL & SONS, PROPRIETORS
Orangeville

From Tremaine's Map of Peel County, 1859—Campbell's tannery stood west of the surviving grist mill. It was one of the six or seven mills and factories along the Credit on the southern edge of Orangeville in 1859.



Orangeville—The Town Hall and former market—1876. Heads of cattle carved on the keystones of the market wing reflect the greater importance of stock keeping after 1870.

chimneys. It was, however, above Norval that quarrying soon developed into an important industry.

When the Grand Trunk Railway was built in 1855-57 the quarries at Limehouse and in the Glen Williams-Terracotta area were well established. The Limehouse kilns may have influenced the choice of line for the railway and a spur line was built to Lot 28, Con. X, west of Terracotta (then the property of James Pearson) where there was a quarry. This line would serve some other quarries en route.

There were now several lime kilns in Esquesing near the quarries north-west of Glen Williams, with a number of freestone quarries in the area between Georgetown, Limehouse and Silver Creek. Lime was being burnt in Erin, near Orangeville, near the "Horse Shoe Bend" on the Toronto, Grey and Bruce Railway south-east of Caledon Village and near Kilmanagh. There were larger lime-producing plants at Acton and Alton and a stone quarry near the latter; while K. Chisholm and Company had begun their operations at the Forks of the Credit and were producing lime and limestone. The great days of the Chisholm sandstone quarries came a little later in the 1880's and 1890's. Sandstone from the Forks was shipped all over the province and a great many buildings in Toronto are built wholly or partly of this stone, among them the Ontario Parliament Buildings (1886-92).

The smaller quarries at the Forks were closed about 1911 and the others not long after. The trade in lime had already declined and finally disappeared in the face of competition from larger firms in better situations. The stone quarries at Silver Creek are disused, as are most of those in Peel County, but some quarrying still goes on near Glen Williams and one or two quarries near Georgetown have been re-opened since 1930. There was a considerable trade in flagstones for sidewalks about the turn of the century and some of these came from the lower river above Port Credit. This trade was revived recently when flagged paths became fashionable in gardens.

(f) BRICK AND POTTERY

Bricks were certainly burnt in the area from the early period of settlement, but until about 1840 this was done by itinerant brickmakers who dug their clay where they could find it near the building, or set up a temporary yard when there was a demand for chimneys in a neighbourhood. There was a permanent brickyard in or near Streetsville by 1850. A few years later there seems to have been one in the village as well as the one in the Old Survey, halfway between Streetsville and Springfield. By 1857 there were yards at Claude, at Norval, at Orangeville and Ballinafad. In the late sixties yards were opened near Glen Williams and Salmonville. The brick works at Brimstone near the Forks appear to date from the 1880's. Most of these plants had a largely local market, but they produced a large quantity of bricks between 1860 and 1900. Several were still in operation in 1911. The large shale brick plant of the Interprovincial Brick Company was established at Cheltenham in 1917. It is now owned by the Cooksville firm, established about the turn of the last century.

An "earthen ware factory" is listed at Streetsville in 1851 and a second pottery was established in the fifties. Later there were potteries at Norval and Orangeville. Potteries and brickyards often made field tile after 1865 and some, like the large terracotta factory that changed the name of Salmonville to Terracotta in the 1880's, turned out the moulded architectural ornament that was used so much with Credit sandstone in the last years of the century.

CHAPTER 8

ROADS AND RAILWAYS 1806-1900

1. DUNDAS STREET

In 1814 the Legislature was forced to vote funds for a thorough improvement of Dundas Street. In some areas this resulted in a good deal of re-alignment, but in the Credit area there were no radical changes of line. The improvements did not go beyond fresh turnpiking and causewaying, with some grading of hills and a fairly thorough removal of stumps and boulders. The highway was still a dirt road, crowned up in the centre, with many stretches of corduroy and very steep hills. Only in very favourable weather can it have been reasonably good by later standards. The Government began a program of road improvement and after 1830 some main roads were macadamized. Dundas Street was surfaced in this way in 1836, from Toronto to the intersection of the Port Credit-Streetsville road and the road is described as excellent in the late thirties.

Dundas Street was one of the roads on which tolls were set up as an experiment in 1836. They were managed at first by special "trustees", but in 1845 the Government took them into its own hands. During the late 1840's these roads were quite profitable, but the public thought that they had been better managed by the Commissioners. They were sold to a private company in 1850. In a few years the railway had reduced the traffic along Dundas Street and when they sold the roads to the counties in 1865 they got a much lower price than they had paid in 1850.

2. THE LAKESHORE ROAD

The new Lakeshore Road was "opened" once more in 1820. This time the work was more thorough and the road seems to have become practically one long stretch of corduroy. After the founding of Port Credit the road was more used, especially in winter and in wet seasons. It shortened the journey from Toronto to Hamilton. By 1850 there was a regular stage on the Lakeshore Road when the steamers were not running, but none in summer.

3. THE CENTRE ROAD OR HURONTARIO STREET

A "Street of Communication" through the centre of the New Survey of Toronto Township and through Chinguacousy and Caledon, was part of the surveys of 1819-20. It began at once to be called the "Centre Road". The idea of extending it to Lake Huron came later, for the letters "W.H.S." and "E.H.S." are not used in descriptions of lots until after 1821. The road is said to have

been "opened" or "cut" by government, but this can only have produced a very rough sleigh track. After that it appears to have been left to the inhabitants to improve and maintain. It was probably as good as the other travelled concessions in the twenties and thirties but little better. It is shown as the travelled road on all the maps from 1850.

4. CONCESSION ROADS, SIDEROADS AND "GIVEN" ROADS

The surveyed concession roads were supposed to be opened by settlement duty, but whether they became travelled roads depended on the difficulties encountered, as well as the amount of work carried out by settlers. A few concession roads became travelled routes for considerable distances, passable for waggons and sleighs. The rest were opened only where there were settlers. The inspections of Clergy lots in 1829 often note that the road in front or behind a reserve was not open; in 1835 such a notation is rare in Toronto and Chinguacousy and not very frequent in Caledon.

The Third Concession Road was one of the travelled roads across Esquesing and probably passable for waggons and reasonably easy for foot passengers. The other travelled road across that township was the Eighth from Hornby to Ballinafad. In Toronto New Survey the Third and Fifth Concessions West appear to have been travelled as far as the Snelgrove Sideroad in Chinguacousy. The Fourth and Sixth were well travelled for about the same distance above the Derry West Sideroad, but were interrupted below it.

This sideroad, between Lots 10 and 11 in the New Survey, and the one between Lots 10 and 11 in Chinguacousy were the only ones opened straight along the surveyed line in 1824 through their whole length. They both connected with roads leading to the Humber mills. The boundary of the Old Survey was open, but just before the Second Concession West a road led across lots directly to the bridge above Street's mills and on, by what became Main Street in Streetsville, to the Townline. This bridge was built about 1823 and was probably the first one above Dundas Street. Such roads across private property (called "given roads" in Eastern Ontario) were very common, especially where there was a mill. Some of them continued for several miles without using a surveyed road allowance, like a road in Esquesing which formed a connection between MacCallum's mill near Limehouse, Charles Kennedy's sawmill and the Williams mills at Glen Williams. This seems likely to have continued up the Credit into Chinguacousy, to give the settlers near Cheltenham and Boston Mills a route to Williams' mill before the Haines grist mill was built.

5. THE GUELPH ROAD

For some years there were discussions about the opening of the road from York to Guelph but in the end none of the direct lines proposed was adopted. Some slight adjustments were made in the existing waggon road and the section of King's Highway No. 7 from Norval to Georgetown was established as a public road. In a few years the completion of the Grand Trunk Railway put an end to these schemes and Highway No. 7 was eventually established as the Guelph Road.

6. PLANK ROADS

The idea of making a road of planks, like an oversized boardwalk, seems first to have been tried by the Canada Company in the Huron Tract just before 1840. When the British Government made a large loan to the Government of Canada in 1841, a part of the money was used to plank sections of the Provincial highways. In 1849 Parliament passed a Road Companies Act, and companies were immediately formed to plank the "Sixth Line and Mono Road", the "Port Credit and Hurontario Road", the "Port Credit, Streetsville, Georgetown and Guelph Road" and the road from Oakville to Erin, which, in 1837, had been established as the lower part of the Garafraxa Road. By 1851 the Sixth Line Road had been planked to Grahamsville, Hurontario Street to Edmondton (Snelgrove), the Guelph Road to Georgetown and the Garafraxa Road to Stewarttown. The planking on this last road was extended to Georgetown, but the others were not carried farther. Planking proved expensive to maintain and gravel or macadam was substituted in the sixties and this type of surface was extended to most of the main roads by 1870.

Tolls continued to be charged after the roads were acquired by the Counties. There had been a great improvement in all the roads by 1870. By 1900 all the travelled roads were good except in the spring or in very wet weather and there had been a great improvement in the dirt roads. However, these roads were not designed for motor traffic and for a time after 1918 there was difficulty in keeping them in condition. This was overcome by a steadily extended program of paving Provincial highways and the more important county roads, and of improving others. The Lakeshore Road was paved before the First World War and the area is now well served by a network of highways.

7. RAILWAYS

Proposal for railways had begun in Upper Canada in the 1830's, but until the Railway Act was passed in 1849 it was not found possible to finance any line. Work on two lines across the watershed was underway in 1851. Both the Hamilton and Toronto through Port Credit and the Grand Trunk line to Guelph were finished in 1856. The Grand Trunk passed through Brampton, Norval and Acton, so that a large part of the area was served by the two lines. It was more than ten years before another railway was finished. The Credit Valley Railroad was built to Orangeville in 1871, and the Toronto, Grey and Bruce from Toronto, by Caledon East and Caledon, to Orangeville in 1873. Six years later the Credit Valley Railroad had a branch passing through Erin and Hillsburgh, and the Hamilton and Northwestern was being built through Stewarttown and Georgetown and across the south-eastern part of Caledon. These lines made a network across the upper part of the watershed so that almost every village was close to a station.

CHAPTER 9

THE RAILWAY AGE

1. THE COMPLETION OF SETTLEMENT

In the Credit Watershed the period of settlement may be said to have ended before 1867. There was to be much further development in the towns and



TOWN HALL, STEWARTTOWN.

Two good stores on the First Floor and a Large Hall on the Second.

From Tremaine's map of Halton County, 1858, Esquesing Township's Hall, "a commodious, brick building" had recently been built in 1851. The brick township hall which now occupies the site has little resemblance to the one of 1858



Caledon Township—Polygonal barns were often built from about 1880 well into this century. They were considered by some builders and farmers to give more space for the material used. Though there are a number scattered over the Province it is rare to find more than one or two in one neighbourhood.



villages and some increase of population in the upper part of the watershed in the next twenty years. But by 1865 every part of the watershed had been occupied by settlers.

Much of the subsequent loss of population was undoubtedly from the farms and this has continued to decline to some extent. However, this movement had begun earlier, as it had in Erin where there was less industrialization. The decline of the villages in Caledon is plainly evident to a traveller who knows something of the history of the area. One or two appear reasonably prosperous, but the rest either show plainly that they have been larger and more flourishing in a not very remote past or have practically disappeared. The areas of abandoned farmland, on the other hand, are not so large and striking as in some other watersheds, perhaps because they are partly wooded and some farms are used for recreation. Nor do these areas seem to have ever been as fully developed as the rest.

There are some sections of this kind in Esquesing which seem to be fast going back to bush and which contrast with the areas of good farms. Here also it may be questioned whether these were not rather backward to begin with. In the lower part of the watershed the loss of population was never serious. The land was mostly too good to be abandoned and though some of the unincorporated villages declined at an early period, few have disappeared completely. The concentration of population in the Toronto region began to affect Toronto Township by 1911 and the southern part is now largely suburbanized. The other townships are all increasing their population, Chinguacousy and Esquesing fairly quickly, Erin and Caledon more slowly.

2. HYDRO-ELECTRIC POWER

It was not uncommon in the late eighties and nineties and around 1900 for towns and large villages to install generators on one of their milldams and generate power to light the houses and streets. Usually this was done by private companies, but occasionally by the municipalities themselves. The dam of the Ontario Mills at Streetsville was put to this use. A municipal plant was built and was retained by the Ontario Hydro-Electric Power Commission at the desire of the citizens. It is still used to reduce peak loads. The earliest of these plants was built by John M. Deagle at Cataract, it is said, before 1890. Deagle is said to have built the first revolving generator in Canada with his own hands and to have bargained with David Smith for a right-of-way across Lot 15, Con. V, Caledon Township, undertaking to supply him with the first electricity ever used to light farm buildings in Ontario. After 1900 electricity was supplied to Erin and Hillsburgh, to Alton, Caledon and Caledon East, and to the brickworks above the Forks and Cheltenham. The company had a contract to supply electricity to light some streets in Orangeville and part of the town. The plant was sold to the Hydro Commission and went out of use and the dam was blown up in 1944.

The Erindale Power Company supplied light to a large part of Toronto Township. Its large concrete dam at Erindale was built in 1910. After the company had been sold to the Power Commission, this dam was also blown up in 1922.

← *The Erindale Dam in 1954. Built in 1910 by the Erindale Power Company, this dam had no connection with the early mills. These were powered by the mill-race from the bank of which the photograph was taken. In 1859 the grist mill stood a little to the right and the sawmill below Dundas Street. The power dam was blown up as a "safety" measure in 1922, after being bought by the Ontario Hydro-Electric Power Commission.*



From Tremaine's map of Peel County, 1859, the James Barber house, Barber's Mills near Streetsville. This modest brick cottage was replaced before 1877 by the large mansion still standing nearer the highway.

3. THE GROWTH OF THE VILLAGES

An outstanding feature of this period is the growth of the village population. This began early on the Credit. Streetsville, Springfield, Norval and Churchville were all villages of some size by 1835. Georgetown may be said to date from the late thirties. It was well established by 1848 and Glen Williams, Cheltenham, Stewartown and Limehouse had been added to the list before 1850. Orangeville was founded in the thirties, but there had been little progress when Orange Lawrence moved there in 1842 and in 1851 it is called a small village. Belfountain and Charleston or Caledon Post Office were old settlements of the 1820's that did not receive recognition until after 1855. The same may be said of Limehouse where a definite village was in existence by 1850. "McMullan's Mills" had developed into "Erinsville" or Erin Post Office between 1846 and 1851, and "Hillsborough" had come into existence in the same period. The beginnings of Acton date from about 1842; it was already of some size ten years later. Alton and Melville are first listed in 1857, when their mills were five or six years old. Meadowvale, which also is first mentioned in that year, was at least thirty years old and a place of more importance.

Inglewood grew up near a station on the Credit Valley Railroad, a short distance from its woollen mills, and Boston Mills got its name and post office with its station. But the railways in this area did not produce new villages to the extent that they did elsewhere.

To deal separately with each of 25-30 settlements is hardly possible. To do so adequately would fill a volume for there is much interesting material in the majority of cases. A good deal of this has already been touched on in the previous chapters, particularly under mills and industries.





THE CREDIT RIVER VALLEY PRESENTS
THE MOST RUGGED TOPOGRAPHY OF ANY
IN SOUTHERN ONTARIO.

2

LAND

CHAPTER 1

THE PURPOSE AND METHODS OF THE SURVEY

A soil conservation survey is made to compile an inventory of soil resources and present use and to appraise the capabilities of the land. From this inventory and appraisal there can be derived a pattern of land use which, if carried out, would adjust the land more nearly to its capabilities.

The principal aim of this report is to recommend a program of soil and water conservation. It is felt, however, that a description of the physical geography and soils of the Credit Valley is helpful in understanding more fully the needs for conservation and the measures required. The watershed has been divided into several natural regions which are discussed and the various types of land use in the watershed and forms of agriculture are described.

CHAPTER 2

THE PHYSICAL GEOGRAPHY

1. BEDROCK GEOLOGY

The bedrocks of the Credit Watershed are sedimentary.

These rocks are divided into shales, sandstones and conglomerates and were formed from clays, sands and gravels, respectively. Limestone and dolomite were formed from the bodies of animals which dropped to the floor of the sea. They are composed largely of magnesium and calcium carbonates.

Sedimentary rocks are stratified as they are deposited in water. The rocks are classified according to eras, formations and smaller units in the time scale. In the Credit Valley region the rocks belong to the Ordovician and Silurian eras, and were laid down almost 500,000,000 years ago.

The bedrock formations were laid down as horizontal strata. Because of a warping movement which raised Western Ontario into a broad dome, called a geanticline, the rock formations dip towards the west. The Credit Valley is on the eastern slope of this broad dome or arch so that there is a general rise in altitude to the west. The Niagara Escarpment is the most outstanding feature. It separates the Western Ontario uplands from the St. Lawrence lowlands to the east. The escarpment is an erosional feature capped by resistant rocks which help to maintain a perpendicular escarpment face as the cuesta is eroded westward through long periods of time.

LANDSCAPE TYPES

The Credit Watershed may be divided into a number of landscape types on the basis of topography, materials and manner of formation. The landscape types are not always continuous and each may contain inclusions of other types.

The *Spillways* are the abandoned channels of former glacial meltwater streams. They are broad troughs paralleled with gravel terraces, and small streams may flow along the bottoms. The coarse, poorly drained soils within the valley often support only a cedar swamp. Pasture and forest are the principal forms of land use.

The main branch of the Credit River occupies a connected spillway system as far down as Glen Williams and the west branch of the river also follows a spillway channel.

The Niagara Escarpment as seen from the Canadian Pacific Railway station at Forks of the Credit. The Credit River flows along a spillway below the escarpment.



The east wall of the gorge below Cataract shows the soft Queenston shale overlain by the more resistant Medina sandstones and dolomites.



The *Orangeville Sandy Hills* are kame moraines where glacial meltwaters deposited poorly sorted materials. The headwaters of the main branch of the Credit River rise in these hills in the north-west corner of the watershed. Rough topography, sandy materials and flat-bottomed swampy valleys are characteristic of these regions. The *Caldwell Sandy Hills* in Caledon Township are characterized by the same rough topography and poorly sorted sandy materials.

The *Erin Till Plain and Drumlin Field* occupies much of the land between the Orangeville Sandy Hills and the Niagara Escarpment. On the rolling till plain in the vicinity of Erin, drumlins or whaleback hills are common and the area is divided by numerous interconnecting cross-valleys. The till is medium-textured.

The *Caledon Moraine* runs diagonally across the northern part of the watershed in several strands. This landscape type is generally hilly and possesses many swampy depressions. The till is coarse and stony, and often contains boulders of considerable size.

The *Niagara Escarpment* is the most outstanding feature of the landscape. South of Credit Forks the escarpment stands out prominently and is marked by vertical cliffs of dolomite, while the red shales of the Queenston formation appear as a sloping platform below the crest. Hummocky and bouldery hills of moraine obscure the escarpment north-east of Credit Forks. Where the different branches of the Credit River cross the escarpment they have cut deep notches into the rock. The *Limestone Plain* with a thin covering of till in some areas lies above the escarpment.

The gently sloping *Peel Till Plain*, lying to the south and east of the Niagara Escarpment, is the largest physiographic region in the watershed. The undulating surface is broken only by steep-sided valleys. The basal layer of fine till is covered by a clay veneer which was deposited in a glacial lake once covering parts of the plain. The small sandy plain around Huttonsville was a delta in this glacial lake.

The *Streetsville Moraine* has a subdued morainic topography. Between the low hills are swampy depressions. The *Shale Plain* which is partly covered with a shallow mantle of till lies further east.

The *Port Credit Sandy Plain* was once covered by the larger glacial Lake Iroquois which occupied the Lake Ontario basin. Along the edge of the sandy plain are ancient beaches. The sandy ridge which obstructs the Credit River was once a bar thrown up by lake waves.

THE CLIMATE

Southern Ontario has a cool temperate climate. Precipitation is distributed evenly throughout the year, although there is a moisture deficiency in late summer. The temperature is high enough to permit the growth of a wide range of crops and various kinds of fruits. Within the watershed there are climatic differences and three climatic regions have been distinguished: the Lake Shore, the Peel Plain and the Upland. The Upland region is cooler, has more rain,

but has shorter summers and longer winters than the other regions. Winds blowing off Lake Ontario over the Lake Shore region modify the winter temperatures of this area.

The Lake Shore region is confined to the Port Credit Sandy Plain. The mean annual temperature is 44 degrees. Summers have a mean temperature of 66 degrees and winters have a mean temperature of 21 degrees. The extreme low temperatures are not low enough to prevent the growth of many varieties of tender perennial food plants. The last frost of spring comes about the eleventh of May and the first frost of autumn comes about the third of October. The growing season, which includes all the days above 42 degrees, averages 197 days. Annual precipitation is 33 inches, with 8 inches falling during the three summer months. Droughts are more frequent than in the other regions, but there is more sunshine.

The climate of the Peel Plain is not modified by winds from Lake Ontario, but the area does have a southern exposure. The mean annual temperature is between 42 and 44 degrees. The mean seasonal temperatures are: winter 21 degrees, spring 41 degrees, summer 66 degrees, and fall 47 degrees. The last spring frost comes about May 15 and the first fall frost about September 28. The average growing season is 196 days. Precipitation is about 33 inches, 8.7 inches falling in the three summer months. Droughts are less frequent than on the lake shore.

The Upland region includes all the land above the Niagara Escarpment. The mean annual temperature is 42 degrees, which is about 2 degrees below that on the Peel Plain. The seasonal mean temperatures are as follows: winter 16 degrees, spring 41 degrees, summer 66 degrees, and fall 46 degrees. There is a wide temperature range of 145 degrees. The growing season averages 189 days and is shorter by a week than in regions to the south. The last frost of spring comes about April 19 and the first frost of fall comes about September 25. The low winter temperatures preclude the growing of many tender perennial plants. The annual precipitation is 36 inches and is 3 inches higher than on the Peel Plain. The average rainfall for June, July and August is 8.9 inches.

CHAPTER 3

THE SOILS OF THE WATERSHED

1. DEFINITION OF THE SOIL

The soil is a thin mantle covering the earth which develops and takes its character from the climate, vegetation and parent material from which it is formed. It is composed of mineral material, micro-organisms and the remains of plants and animals. In the soil the plants germinate, and from it take in moisture and necessary elements in solution for growth and maturation. The quality of a soil is measured in terms of the vegetation it supports, and its economic importance to man.



Rough topography and stony soils are typical of the Caledon Moraine. This land is suitable for use as pasture for beef cattle.



Fine herds of Holstein-Friesian cattle and well-kept farm buildings are characteristics of the dairy belt around Norval.



Oneida clay loam is the most productive soil type found in the watershed. The gray, leached (A), horizon can be clearly seen overlain by the dark topsoil.

2. THE GRAY-BROWN PODZOLIC SOILS

The character of a soil is determined essentially by the climate and the natural vegetation. The soils of the watershed, like most soils of Southern Ontario, were formed under a moist, cool temperate climate and a covering of hardwood or mixedwood forest. Soils formed in this environment exhibit the same characteristics, and are called gray-brown podzolic soils.

3. THE SOIL PROFILE

The soil profile is a cross-section of the soil, revealing the different levels or horizons composing it. Leaching of plant nutrients may be a major problem in such soils because as the water moves rapidly downward it carries away soluble minerals to depths which cannot be reached by the plant roots. Because of the rapid drainage these soils tend to be droughty. The continuous movement of air through the soil leads to rapid oxidation of the soil organic matter. Conversely, poorly drained soils accumulate organic matter in the upper layers, and develop a sticky gray clay level below called the glei horizon.

4. SOIL CLASSIFICATION

Soils are grouped into categories called catenas which can be described and readily recognized. The soil catena includes soil series developed on similar parent material, but differing in profile characteristics because of natural interior drainage. The soil series is a group of soils with genetic horizons similar as to differentiating characteristics and arrangement in the soil profile, and developed from a particular type of parent material. The characteristics include colour, structure, organic matter content, chemical reaction and texture.

The soil type is the principal unit of mapping, and is more specific in character. The soil type name consists of a series name plus the textural class. As an example, in the Dumfries catena two soil series are recognized: Dumfries series which has good drainage, and Lily series which is poorly drained. Dumfries is a soil series, and many be divided into two types: Dumfries loam and Dumfries sandy loam.

5. MAJOR CATENAS ON THE WATERSHED

On the Peel Plain the most important agricultural soils were developed over fine-textured shale and limestone till, and on lake clays underlain by clay till. The Oneida catena, developed over fine-textured till, covers a broad zone from the escarpment to Streetsville. South of Brampton is the Cashel catena developed over heavy clays of lacustrine origin. The Harriston catena in the north-west was developed on medium-textured till, as was the Guelph catena further west. Also in the north-west is the Dumfries catena developed over coarse till. The Bookton, Hillsburgh, Brighton, Fox and Pontypool catenas were all developed on sands of different textures, and are in morainic deltaic or outwash regions. The Caledon catena occurs on well-sorted outwash gravels. Where the bedrock is exposed three catenas are recognized: the Lockport, formed over red shale; the Brockport, formed over gray shale, and the Farmington, formed over limestone.

MUCK AND BOTTOMLAND SOILS

In areas of poor drainage, in depressions, in the bottoms of spillways and in inter-drumlin areas the excess moisture slows down decomposition of plant matter so that there is considerable accumulation of muck. Since muck soils are poorly drained, they are used mainly for summer pasture and for woodland.

Where the main streams and some of their tributaries flow through broad valleys, the valley bottoms are subject to floods, especially in the spring. The soils of such areas are silty and covered with recent deposits of sediment, so that there is little or no profile development; they therefore cannot be assigned to any particular soil zone. Because of the poor drainage and periodic flooding, these soils are unfit for regular cultivation and are usually covered by pasture or woodland. They are lumped together under the general term of bottomland.

EVIDENCE OF SOIL EROSION

The soils in the Credit Watershed have been denuded of their forest cover and exposed by cultivation for about a century and a half. Rain beating against the soil and running off down the slope carries away the tiny particles that make up the soil. The most common form of erosion, sheet erosion or "wash", is insidious for it cannot be easily detected. After the humus-rich absorbent upper horizons of the soil are removed the compact subsoil is exposed. Gullies develop as run-off water is channelled down the slope.

The most obvious evidence of erosion is the gully. Gullies and blowouts (which bear the same relationship to gullying except that the agent is wind, not water) are advanced forms of soil erosion. Sheet erosion must have continued for some time before gully erosion becomes apparent. In the spring and summer, rills are easily discernible on slopes of fallow fields or fields with intertilled crops. Often after a heavy rain fans of coarse sandy material will be formed at the bottom of a slope where the rills terminate. Rills are easily obscured by implements, but they are positive indicators of erosion. The wind blowing over fields also picks up fine loose material. Blowouts are a hazard on all droughty, sandy soils of the watershed.

CHAPTER 4

PRESENT LAND USE

The trend of agriculture in the Credit Watershed appears to be towards greater specialization. The old self-sufficing farm has almost disappeared, except in a few isolated cases. The mixed farm has for long been the common type, but with growing urban markets, higher prices and better transportation facilities, the mixed farm is changing as well. With the growth of nearby Toronto, the demand for fluid milk has been felt farther and farther afield. The demand for fruit and vegetables has also increased and appears likely to continue to do so. The net result will be more land devoted to specialized vegetable production. Cash crops are being widely grown and livestock raising is replacing mixed farming. To meet these changing demands on the land, a

gradual readjustment in land use is taking place. It is a function of the Authority to direct this change into the most suitable pattern.

The following table shows the acreage and proportion of each of the present land uses.

TABLE OF PRESENT LAND USE SHOWING ACREAGES
AND PROPORTION OF EACH USE TO THE TOTAL AREA

Land Use	Acreage	Per Cent
Tilled for crop.....	2,054	0.9
Fallow.....	1,440	0.7
Row crop.....	4,613	2.2
Vegetables and small fruits.....	888	0.4
Orchard.....	2,311	1.1
Spring grain.....	36,164	16.9
Winter grain.....	7,302	3.4
Hay.....	40,377	18.8
Farmstead.....	3,580	1.7
Waste land.....	9,880	4.6
Pasture.....	63,587	29.7
Tree plantation.....	493	0.2
Forest.....	34,537	16.1
Urban and other non-agricultural uses.....	6,142	3.0
Water.....	761	0.3
TOTAL.....	214,362	100.0

To summarize, present use is in the following proportions:

Forested.....	16.3%
Pastured.....	29.7%
Cultivated.....	44.4%
Other uses.....	9.6%
TOTAL.....	100.0%

Along with the growth of Toronto has gone the growth of neighbouring towns and villages. The lower part of Toronto Township is being rapidly urbanized, although this land is excellent for growing fruit and vegetables. The acreage of land given over to market gardening and orchard is becoming larger in the Huttonsville area and will probably expand into the upper part of the watershed.

The Toronto Milkshed, or milk supply area, extends across the Credit Watershed as far as the Niagara Escarpment. On the Peel Plain dairying is the dominant agricultural industry. Dairying will never become as important on the land above the Escarpment, but fluid milk sales will grow and the number of dairy cattle will increase. The acreage of cultivated land in the dairy belt has remained much the same over the years. About 60 per cent of the land in the dairy belt is cultivated, and any conservation program must take into consideration the demonstrated demand for regular cultivation.

In the region above the Niagara Escarpment about 40 per cent of the land is under cultivation, and the amount seems to be decreasing. Beef and mixed farming with cash crops are the most common types. The number of beef cattle kept on the farms has increased about two and one-half times during the last fifteen years. Increasing acreages of land with infertile soil are being devoted to pasture as a better use. This trend to grass farming is a good one from the point of view of soil conservation. Cash crops are likely to increase in importance. The number of swine and sheep kept has decreased over the years.

The use of the land is determined by physical, social and economic factors. Because land use is partly determined by other than physical factors, the use of the soil cannot fully be brought into accord with its physical limitations. Nevertheless, this is no excuse for lack of appreciation of good land management, and it is recommended in this report that land use be adjusted as closely to the capability of the land as possible.

CHAPTER 5

FACTORS LIMITING LAND USE

1. INTRODUCTION

The major problems restricting land use in the watershed are as follows: water erosion, aridity or droughtiness, topography, massive clay soils, poor drainage, boulderiness, stoniness and shallowness over bedrock. In this report all of these factors are discussed with reference to their origin, the restrictions they place on land use, and the remedial measures required to correct them if such are possible.

FACTORS LIMITING LAND USE

Limiting Factor	Acreage	Per Cent of Total
Unrestricted.....	7,206	3.4
Erosion.....	76,282	35.6
Excessive drainage.....	1,325	0.6
Topography.....	47,273	22.0
Massive clay.....	708	0.3
Inadequate drainage.....	25,465	11.9
Boulderiness.....	3,953	1.9
Stoniness.....	4,954	2.3
Shallow soils over bedrock.....	158	0.1
Forest.....	35,030	16.3
Non-agricultural use.....	12,033	5.6
TOTAL.....	214,387	100.0

2. SOIL EROSION AND RUN-OFF

The moisture received by the land, whether from rainfall or melting snow,

is partly absorbed by the soil and some is held for plant use. The remainder is lost. Two types of water losses are recognized: (1) the downward movement of gravitational water by percolation, and (2) the run-off of excess water over the soil surface.

When the land is cleared the soil is easily carried away by moving water. There are several distinct types of water erosion: sheet, rill and gully erosion. Sheet erosion or "wash" removes the soil more or less uniformly from every part of the slope.

Forests and grasslands are the best natural soil protectors. Field crops vary in their influence. Intertilled crops, such as corn, tend to encourage erosion. Fallow or tilled fields are most open to erosion as there is no cover to break the run-off over the slope. Wheat and oats offer considerable obstruction to wash, while close-growing hay and pasture are able to break the force of the rain drops and slow run-off to a point where little erosion occurs. On shallow slopes where intertilled crops such as corn and potatoes are grown, contour tillage should be practised to reduce run-off. Strip-cropping (alternating strips of intertilled crops with hay or grain) checks the flow of water. Each furrow along the contour acts as a miniature dam holding back the water so that more may enter the soil. Diversion ditches and grassed waterways are recommended to carry off the excess water harmlessly. On droughty slopes contour furrowing may help permanent pastures and young plantations. On steep slopes terraces constructed across the slope catch the water and conduct it away at a gentle grade. The use of green and barn manures builds up the organic matter in the soil, reducing run-off by increasing the absorptive qualities of the soil.

Erosion is widespread in the watershed; it occurs on most slopes, but the finer soils and steeper slopes are affected more severely.

3. EXCESSIVE DRAINAGE

Aridity is a problem over wide areas of the watershed. Sandy and gravelly soils are easily cultivated in the spring, and as a result are called "warm" soils, but later in the season they become droughty. This is because of their coarse texture and loose structure which allows water to percolate rapidly down through the soil to lower levels out of reach of plant roots. This gravitational water dissolves and carries away plant nutrients in solution. Since these soils have a low inherent fertility, cultivation soon lowers their productivity.

When the till covering the limestone bedrock is thin the soils tend to be droughty. On the watershed Farmington loam is the worst in this respect. Water loss is so rapid that crop production is prohibited. Forestry and grazing are the best land uses. Where the soil cover is thicker, pasture is recommended. During the spring season, and again after the fall rains, fair pasture is provided. The cattle should be moved to better pastures during the summer. The thinner soils are better forested, their value as pasture being very low.

4. TOPOGRAPHY

Indiscriminate clearing of steeply sloping land has led to widespread erosion.

After 10 to 50 years of cropping, much of this land has lost most, if not all, of its soil. Excessively steep land and irregular landforms are also impractical for tillage by regular power machinery. Today, steep slopes are tilled in marginal areas only. Elsewhere such land has been allowed to revert to scrub forest or marginal pasture. Land restricted to agricultural use by topography is found along the escarpment in the morainic regions and along the spillways.

Steep hillsides are droughty because of the rapid run-off and the soil profile is shallow because of erosion. These lands are better in pasture and forest. Where feasible, contour furrowing may be used to decrease run-off and so add to the soil moisture.

5. MASSIVE CLAY SOILS

Massive clay soils suffer greatly from sheet and gully erosion and the red clays above Cheltenham have been deeply carved by water action. The nature of the material permits rapid run-off. Heavy soils are also prone to cloddiness or "puddling" if cultivated when wet. A clay soil of high plasticity becomes hard and cloddy due to the cohesive tendencies of the clay particles. These soils are droughty in late summer, especially those on slopes. If the water table is high in the spring, root development is restricted. Later in the summer the water table falls, and the plants suffer from lack of water.

6. INADEQUATE DRAINAGE

Drainage promotes granulation which creates a better soil structure and consequently a better tilth. The draining of wet land also permits earlier spring cultivation and helps to maintain a sufficiently deep and effective root zone. Soil temperatures are higher in drained land and evaporation may be reduced. The greatest benefit perhaps comes from an increased aeration of the soil. The decay of organic matter takes place more rapidly as the oxygen content rises, and nitrification is increased. By lowering the water table more water enters the ground during rain storms, controlling run-off so that erosion is reduced.

7 AND 8. BOULDERINESS AND STONINESS

The rugged moraines which run south and west of Credit Forks are composed of coarse till which is particularly stony. The Dumfries and Lily loams are characterized by the larger number of stones throughout the soil profile, especially in the lower horizons. It is a slow and laborious task to clear fields of stones by carrying them to the fencerows.

The removal of stones larger than two inches may result in a greater loss of soil through erosion. Stony soils such as Dumfries loam are often light, and easily worked in the spring. The steeper slopes should, however, be left in pasture or forest as the clearing of stones may do more harm than good.

9. SHALLOWNESS OVER BEDROCK

Shallowness becomes a problem where there is less than three feet of soil over the underlying bedrock. There are two areas in the watershed where this

Fields in the moraines have been cleared of stones only at the cost of much labour. Stone piles and stone fence rows obstruct cultivation and harbour noxious weeds.



The severely eroded and gullied red clay soils constitute one of the chief problem areas in the watershed.



Pasture improvement pays in increased milk or beef production.



situation prevails: (1) the Erindale shale plain and (2) the limestone plain which runs from Credit Forks southward along the top of the escarpment. Soils developed over shale may be limited by either droughtiness or poor drainage. Farmington loam which developed over limestone is limited by droughtiness. In both areas cultivation is hampered by bedrock outcrops and the limestone plain is bouldery as well.

CHAPTER 6

SOIL AND WATER CONSERVATION MEASURES

1. SOIL CONSERVATION

It is the aim of soil conservation to use every acre of land according to its capability.

Proper soil management is necessary to keep the soil at its initial productive level, or to raise it. By proper management crop yields are maintained or increased. The aim of conservation is to make possible a sustained yield of crop production from the land. Not all the conservation practices here described are applicable to any one body of land, but one or more will be applicable to each farm. It may be that major changes will be necessary on some farms but many will require only the adoption of special practices on some of the land.

2. GOOD SOIL MANAGEMENT

Good soil management is needed on all cultivated land. This means the maintenance of a good soil structure and satisfactory soil moisture conditions. Soil granulation is encouraged by proper maintenance of soil humus. Crop rotation is a necessary part of soil management and influences the soil structure, chemistry and biology. It helps to improve soil structure, conserves soil nutrients and increases humus content. All these improvements in the soil's condition produce better moisture relationships and aid in reducing erosion.

3. COVER CROPS — MULCHES — CROP ROTATIONS

Exposure of the soil for any length of time leaves the land unprotected against soil erosion and water losses. It is common practice to leave some of the land bare in the spring and fall when heavy rains can result in a great deal of erosion. Fields are also left fallow during the summer and winter. To protect the land the provision of a cover crop as long as possible is recommended. If the land must be left bare, then a rough surface decreases run-off.

A mulch cover such as wheat stubble reduces the impact of rain on the soil and slows up run-off. Water evaporation is also reduced, and more rainfall is absorbed into the soil. The humus content of the soil is maintained and bacterial activity increased. Suitable crop residues include corn stalks, grain stubble, refuse from potato plants and rotten hay or straw not needed for other purposes. A stubble mulch also reduces wind erosion on light soils.

A major soil conservation measure is the well-planned crop rotation. A crop rotation should be designed to return organic matter to the soil, either as green manure or in crop residue. A crop rotation may include a cultivated crop, a small grain, and a grass and/or a legume. The cultivated crop exposes the soil to maximum erosion, small grains allow less erosion, and the grass or legume provides cover enough to largely control erosion and aids in maintaining soil structure and fertility.

4. PASTURE IMPROVEMENT

Marginal land lacking in soil fertility or land too rough to be economically cultivated is better kept in permanent pasture. This applies especially to light soils which quickly lose their fertility, or wet soils with a high water table making for late seeding and poor root development. A thick grass cover protects the soil from erosion and slows up the surface run-off of water, allowing its absorption into the ground. Grasses are soil-builders and their extensive root systems remain in the soil to add to the organic matter. Improved pasture is nutritious and beef and milk production is higher from those cattle using it. Pasture improvement is further discussed in Chapter 8.

5. DRAINAGE

Many soils are inadequately drained. Soils may be described as either imperfectly drained or as poorly drained. Imperfectly drained soils have a fluctuating water table which is high in the spring but which falls during the summer. Poorly drained soils have a constantly high water table throughout the year. The former soils usually require simple tile drainage to lower the water table. The latter soils require more extensive drainage systems, including ditches.

Wet land may be drained by either tile systems or open drains. Ditches can carry away more water, and at a lower grade, but are inconvenient. They need to be cleaned periodically, weeds are difficult to control, they occupy valuable land, and may, at times, prove a hazard to stock. Tile drainage is generally a better method, but may prove more expensive. The tiles are so arranged that the water is led rapidly to an outlet, usually a grassed waterway or ditch. It is essential that the outlet be protected or gullying may result. If no outlet is available then the land may be better left in pasture or woodlot.

6. FARM PONDS AND IRRIGATION

There are many sites on the Credit Watershed which are suitable for farm ponds. Ponds may be constructed along streams, spring lines, or watercourses. There are six types: dug-out, spring-fed, by-pass, run-off, permanent stream, and the temporary type on permanent streams. A bulletin on farm ponds is available from the Ontario Department of Agriculture but anyone interested in their construction would be well advised to seek the advice of the County Agricultural Representative. Farm ponds are generally used for stock watering, but they may also be used for irrigation, recreation, barn or domestic supply, or fire protection.

Irrigation as a means of supplying water in the growing season has been adopted by a number of farms. This method is most used in the Huttonsville area, where the growing of vegetables and small fruits on the sandy soils has led to great demands for water. The water is taken from the Credit River and at the present time there is no deficiency. There is only so much water in the ground and in the streams, however, and a water shortage could develop. In such an event it might be necessary to regulate the use of water to ensure a fair and equitable distribution for everyone.

7. CONTOUR CULTIVATION AND STRIP-CROPPING

When land is cultivated by contour the furrows and drill rows run across the slope or on the level. This contrasts with the general practice of cultivating parallel to the field boundaries regardless of slope. Contouring reduces soil loss by water erosion because more of the water is absorbed by the soil. The furrows and drill rows at right angles to the slope act as tiny dams which catch and hold the water. Contour cultivation also saves power, time and wear on the machinery.

Simple contouring may be sufficient on very gentle slopes. On steeper slopes contour cultivation must be combined with strip-cropping. Strip-cropping means alternating bands of cultivated crops with bands of close-growing grasses or legumes. Grass strips act as buffers to break the force of the water and to catch the soil eroded from the cultivated strips above. Sod also improves soil fertility and increases the organic content of the soil. Crop rotations which include two years of sod cover on one strip may be necessary. Such a crop rotation may be as follows: corn, oats, hay. On even steeper slopes terracing can provide greater protection. Grassed runways and diversion ditches, as described in the next section, should be used to carry off surplus water.

8. GRASSED WATERWAYS AND DIVERSION DITCHES

A grassed waterway is a means of carrying harmlessly away excess surface water from a slope. It should be constructed along a natural run-off channel if possible. If no natural channel is available then one may have to be constructed. To be effective and safe a thick sod must be maintained along the waterway. The sod also catches and holds topsoil which is being carried away. The grassed waterway should be wide enough and have sufficient capacity or gullies may form along the cultivated soil parallel to the sod strip.

To divert water harmlessly from a slope to a grassed waterway or other channel diversion, terraces may be constructed. These are broad troughs with gently sloping sides and they run slightly off contour to a suitable outlet. This device is particularly useful on slopes that are ordinarily not suitable for contour cultivation.

9. REMOVAL OF STONE FENCES, STONE PILES, AND BOULDERS

In the past much labour has been expended in the clearing of stone, and many piles are to be seen along fencerows and in fields. The stone pile or fence-

*A grassed waterway
through a field of oats.*



*A spring-fed
pond two miles
east of Hillsburgh
constructed for
fire protection.*



*An excellent run-off pond constructed in a hollow of the hills
near Inglewood provides water throughout the summer.*





Cultivable land which is not restricted in use is level, well-drained and uneroded. There are no restrictions as to use and a high crop production results from good soil management. Oats is a widely grown crop in the watershed.



Long, smooth slopes lend themselves to contour tillage practices. Cultivation across the slope prevents soil and water losses and excess surface water should be carried away safely by grassed waterways.

Contour tillage prevents soil and water losses.



row may be a major obstruction to conservation farming. Fences were usually laid out to form rectangular fields irrespective of the lay of the land and for conservation measures such as strip-cropping it is often necessary to remove them. Where the fence or much of the fenceline is stone the problem of removal is increased.

Large boulders can be removed by a bulldozer or they can be buried deeply enough in the ground to permit cultivation. Stone piles and stone fences can be buried in trenches constructed for the purpose. Stones may be used to construct underground drains if laid out in a ditch and covered over. Where conservation farming is to be carried on and stone fences and piles would obstruct the program their removal should have a priority of interest. For the individual, however, the cost of such a program might prove prohibitive. The Authority could make machinery available, or offer financial assistance to farmers who are planning a conservation program in which it is necessary to remove such obstacles.

10. WOODLOT MANAGEMENT AND REFORESTATION

Proper woodland management and private reforestation on farms is an integral part of the watershed conservation program.

CHAPTER 7

RECOMMENDED LAND USE

THE CLASSIFICATION

The Credit Watershed was surveyed on a reconnaissance scale in the summer of 1954. The lands were classified in terms of recommended use. This classification involves a consideration of the inherent characteristics of each body of land, its present use and its use capability, i.e., the use to which it is ideally suited. The recommended land use map provides a frame of reference for the conservation-minded and a guide to the Farm Planning and Land Use Advisory Board. It should not be used in the same way that a farm plan is used. The farm plan is especially made to fulfil the needs of the individual farmer.

It will not be possible to use all the land according to its capability because of many disrupting economic and social factors. Also, the land-holding pattern makes difficult the use of each type of land according to its capability. However, major disruption of the existing landscape is not necessary to carry out a soil and water conservation program. In many cases only slight changes are needed in the present farm program to bring it into accord with conservation principles.

Two broad classes are recognized on the watershed: land suitable for permanent vegetation and land suitable for cultivation. Cultivable land should remain in crop production because of its capability. Depending on conditions, the poorer land may be capable of producing good quality pasture or be more suited to forestry.

RECOMMENDED LAND USE CLASSES

Six classes of recommended use are used in this report. Agricultural land may be used as cropland, pasture or woodlot. Cropland may be classed according to the need for special conservation practices such as strip-cropping or drainage. The six land classes are defined here:

TABLE SHOWING THE PROPORTION OF LAND
IN EACH RECOMMENDED CLASS

Class	Acres	Per Cent
L.....	7,206	3.4
LD.....	10,511	4.9
CF.....	9,844	4.6
LR.....	90,391	42.2
P.....	38,678	18.0
F.....	10,674	5.0
Existing forest.....	35,030	16.3
Other uses.....	12,033	5.6
TOTAL.....	214,387	100.0

L — Cultivable Land, Not Restricted in Use

Land classified as having no restrictions in use is adequately drained, and has no erosion problems. This type is also free from other cultivation problems such as excessive stoniness, boulderiness, droughtiness or acidity. The land is either level or has a slope of less than three per cent. The soils are loamy and have a good structure. Internal drainage is good and the soil profile is relatively deep. Regular three- or four-year crop rotations, with applications of manure and commercial fertilizers, are sufficient to keep the soils productive.

LD — Cultivable Land, Drainage Required

Only a small proportion of the poorly drained land in the watershed is considered drainable. About 5 per cent of the watershed is so classified. Tile drains and ditches can normally take care of the excess water in this type. The other lands requiring drainage, but possessing no outlet or requiring costly drainage installations, have been placed under either class LR or P. The class to which they are assigned depends on the severity of conditions and the acreage involved.

The largest acreage of poorly drained land which may be drained is in the Peel Plain where many of the flat inter-stream areas are so affected. There is also a large acreage of this type in the inter-stream areas in the Erin Till Plain.

On the Peel Plain much of this land is at present in pasture and is likely to remain so because of the need for pasture. However, grass grows better on well-drained soils and the drainage of these lands may be considered desirable.

CR — Cultivable Land, Contour Tillage Required

In this class are areas with smooth slopes suitable for contour methods of cultivation. The necessity for contour tillage arises because of the rapid run-off and the need to conserve soil and water. Within the watershed about 4½ per cent of the land is suitable for contour cultivation. Unfortunately, many otherwise suitable slopes cannot be protected by contouring because of cultural obstructions, such as buildings, roads or fencerows.

The special practices recommended on this type of land are contour tillage, strip-cropping, diversion terraces and grassed waterways. These special practices are described in the chapter devoted to soil and water conservation measures. Strip-cropping can be applied to many slopes on the Peel Till Plain, especially on the low ridges which run in a north-south direction. In the drumlin field the slopes are often somewhat steeper and all of the special practices may be needed to do an effective job.

LR — Cultivable Land, Restricted in Use

Much land is cultivable, but is restricted because it is highly susceptible to erosion, is irregularly sloping, stony, bouldery, acidic, inadequately drained or droughty. Conservation practices such as drainage or contour tillage are impracticable because of lack of drainage outlets or irregular slopes. These soils should be protected by extended crop rotations in which the land is broken only once or twice every five years. A grass or legume cover should be kept as long as possible to conserve the soil and to build up the organic content. Every possible method of soil rebuilding should be practised, including winter cover crops, green manure and applications of barn manure. Intertilled crops such as corn, potatoes, or roots should be restricted to gentler slopes. In some places strip-cropping may be practised even though the slope is irregular. Grassed waterways may also be used.

P — Land Recommended as Pasture

Land recommended for pasture is not desirable for crops. The productivity of such land is generally low and much of it is limited as to use by topography.

Cultivation may also be precluded by stoniness, boulderiness, or the occurrence of bedrock outcrops. Low wet areas in a field may make cultivation difficult. Under cultivation sandy soils are exposed to wind erosion and a permanent cover of vegetation is desirable. Bottomlands make excellent pasture, but flooding rules out cultivation. Massive clay soils or droughty soils are better under grass because of their low productivity. The establishment of rich, nutritious planned pasture will be reflected in the greater production of beef and milk.

F — Land Recommended as Forest

Extensive areas of soil of proven low capability have been designated as forest land for acquisition by the Authority.

CHAPTER 8

A RECOMMENDED CONSERVATION PROGRAM

1. THE AUTHORITY AND ADVISORY AGENCIES

In order to carry out its task the Farm Planning and Land Use Advisory Board must call upon various government and private bodies to assist it in the carrying out of its program. The Department of Agriculture is the most important agency which the Advisory Board can call upon. The Agricultural Representatives of Dufferin, Halton, Peel and Wellington Counties are the normal channels to use when technical assistance is required. The Soil Advisory Service of the Department of Soils, Ontario Agricultural College, provides specialists in farm planning. Other departments which may be called upon to render help and advice are the Agricultural Engineering, Field Husbandry, Animal Husbandry, and Agricultural Economics Departments.

Various non-governmental organizations are dealing with agricultural and conservation matters. The Soil and Crop Improvement Association takes an active part in encouraging a soil and water conservation program.

In order to further pasture improvement, a program of education should be considered. The literature published by the Department of Agriculture, and made available through the Agricultural Representative, should be distributed to all interested farmers. Several film releases have been made available, such as the O.A.C. production, "More Beef per Acre". These films could be used at meetings of farmers to show the benefits of pasture improvement.

THE FARM PLAN

The purpose of the farm plan is to lay out a farm so that each section of the land is used and managed according to its capabilities.

In Ontario, responsibility for farm planning has been delegated to the Soil Advisory Service of the Soils Department, Ontario Agricultural College at Guelph.

A farm planner surveys the farm, field by field, and maps his findings on an aerial photograph. The soil series and types are identified, and their boundaries are delineated. The degree of erosion is estimated by examination of the soil profile. The slope of the land is measured and the soil-limiting factors described. Watercourses, either permanent or intermittent, are mapped. Gullies and over-deepened watercourses are also noted and mapped. From all of this information a map of use capability is made.

The plan of the farm is then worked out so that each piece of land is used as closely as possible according to its capability. Where necessary, changes

are made in tillage and cropping practices to prevent soil erosion. Basic to good farming is soil management, and the plan attempts to arrange the cultivation practices so that this can be achieved. In many cases a well-planned crop rotation is sufficient to keep the soil in a good condition. On sloping land strip-cropping or contour cultivation may be recommended. The installation of grassed waterways and tile under-drainage may be recommended to take care of intermittent run-off. Where land is inadequately drained, plans for ditching and for tiling may be made. Farm ponds, reforestation and pasture improvement schemes may also be recommended.

A system of crop rotation will be worked out to conform with the needs of the farmer. It would include the correct balance of pasture, hay, grain and other crops necessary to meet the requirements of the herd which the land must carry. The rotation system would be designed to take care of changing needs. Where special practices such as contour tillage are required a transition period is arranged so that a year of cropping is not lost. Special devices such as grassed waterways or terraces may take more than one year to get into working shape. For this work the services of an agricultural engineer may be required; his services are available through the Agricultural Representative.

Most changes which have to be made to carry out the farm plan can be done with the farmer's own equipment, but there are some things, such as the construction of farm ponds, drainage ditches, or diversion terraces, which require heavy earth-moving or grading equipment. The Authority might well make equipment available to the farmer who is carrying out a farm plan. In regard to farm ponds a grant is made toward construction, and application for this should be made through the Authority.

By the summer of 1954 seven farm plans had been completed in that part of Chinguacousy Township within the watershed. Farm plans had been drawn up for farms in other townships as well, and several farmers had applied to the Department of Agriculture for farm plans. This shows an increasing desire for farm plans by many farmers, and the Authority should provide further information so that more farmers will take advantage of the services offered. Farm plans have been or will be prepared for dairy, mixed and beef farms. The adoption of a farm plan for every farm in the Credit Watershed should be the aim of the Authority.

THE RED CLAY SOILS: AN EROSION PROBLEM

A problem of immediate concern to the Land Use Advisory Board is the red clay in the Terra Cotta-Inglewood area. These soils are severely eroded and gulying is common on the steeper slopes. The red Queenston shale weathers into a massive and unabsorptive soil, the Lockport clay. Lockport clay, eroded phase, occurs as a band along the face of the Niagara Escarpment and is about 700 acres in extent. It is low in organic matter, phosphorus, potassium and calcium and gives an acid reaction. Since crop production on this soil is limited by low fertility, its use either as pasture or as forest is recommended.

Severe sheet erosion and gulying over large areas occurs above Cheltenham and Terra Cotta. To prevent continued erosion a grass or tree cover is required

and over-grazing must be stopped. A program of reclamation of the severely eroded red clay is recommended. Reclamation may be undertaken either as a pasture improvement scheme, as a reforestation project, or both.

Reforestation is the best use of the more severely eroded portions of this soil and some of the land is so severely eroded that ultimate reclamation by any means other than reforestation is out of the question.

THE PROBLEM OF WIND EROSION ON THE CREDIT WATERSHED

Wind erosion is something of a problem on the light and excessively drained sandy soils of the Credit Watershed. Extensive areas of such land are found in the Orangeville and Caldwell sandy hills. In these regions soils have suffered erosion by both wind and water and in some cases it has been severe. Whereas water erosion is usually more severe on steep slopes, soil blowing may become an acute problem on either level or sloping land. Pontypool sandy loam, a soil type common to both above-mentioned regions, is susceptible to wind erosion and in addition suffers from excessive drainage and low fertility. Other soil types with the same problems are Hillsburgh and Brighton sandy loams.

Under natural conditions significant wind erosion never occurred in Southern Ontario. With the removal of the permanent vegetation cover and with the cultivation of the soil, conditions favourable to wind erosion were created. Depending on texture and organic matter content, soils vary in their resistance to wind erosion. Coarse sands are more likely to blow than fine sands. Organic matter in the soil binds the soil particles together and retains moisture, thus reducing the hazard of wind erosion.

This hazard is low if the soil is protected by a cover of permanent vegetation. Either forest or pasture will protect the soil adequately, and where the hazard of wind erosion is great, permanent vegetation is recommended.

It is advisable that a survey be made of any area which is to be drained. Such a survey will show the type and size of drains required, where the drains should be located, the best outlet, and any land use changes which are necessary. Any farmer who wishes to drain his land should apply to the office of the County Agricultural Representative for a drainage survey. Agricultural Engineering Fieldmen are made available by the Department of Agriculture for surveying land for which drainage is proposed.

Financial assistance is available from the Province of Ontario under the several drainage Acts in force.

The source of the Credit River, Caledon Twp. 3 miles east of Orangeville.





LESS THAN SIX PERCENT OF THE
WOODLOTS SHOW GOOD REGENERATION,
FIFTY PERCENT ARE GRAZED.

3

FOREST

CHAPTER 1

THE FOREST IN THE PAST

1. AT THE TIME OF SETTLEMENT

The townships comprising the Credit Watershed were all surveyed between 1806 and 1822. From the surveyors' field notes it is clear that they worked through a primeval forest almost unbroken except for an occasional "beaver meadow" or patch of windfall. In the valleys they found cedar, tamarack or

"aulder" swamps and black ash "swails". On the valley slopes hemlock was common. Over most of the watershed the uplands were covered with stands of hard maple and beech, with a mixture of basswood, oak, ash and elm. In the central part of the watershed, pine was sparsely scattered through the hardwood forest. In the north, pine was more abundant, but only near the lake the did surveyors record the timber as being principally pine and oak.

The modifying influence of Lake Ontario is reflected in the presence of walnut, noted by Wilmot in the Toronto Township survey of 1806.

2. CLEARING THE LAND

Although the forest supplied the early settler's meagre needs for construction material and fuel, this was but a drop in a seemingly limitless sea of supply. Transportation was poor, and markets for his woodland produce extremely limited. For agriculture to develop the forest must go, and much of it was piled and burned. Settlement duties required a certain amount of land to be cleared before a patent could obtained. Until about 1910, the decrease in woodland was rapid. After that the small remaining area, 5 to 14 per cent, was at least tolerated, and in some cases has probably shown a slight increase.

3. FOREST PRODUCTS

The system of reserving pine and oak for the British Navy was already weakening when settlement in the Credit area began, and although we find a few lots marked for "Masting" in the original survey of Toronto Township, these apparently were soon released for settlement.

The square timber trade commenced, no doubt, somewhat later than the mast trade and was carried on simultaneously with it from the thirties.

As settlement and trade grew, sawmilling became important. In 1859 there seem to have been 58 water-powered mills and four steam mills operating on the watershed. Not only good export conditions but also a vigorous local demand stimulated forest production. From 1840 to 1870 a large amount of lumber and squared timber was used for local construction, and particular species were in demand for the manufacture of vehicles, furniture, barrels and woodenware. Local building had slackened off by 1875. The making of vehicles continued until about 1890.

In the Census of Canada returns the peak production for most forest products was in 1880 or 1890. Soon after 1900 such products as tanbark, lath-wood, masts, staves, shingles and piling drop from the list, and production of other products shows a sharp decline. The one product which persisted throughout the record is fuelwood, which dropped from a peak of 294,756 cords in 1880 to a low of 32,642 cords in 1950. This decline reflects both the decrease in available supply and the increasing competition of other fuels.

Maple sugar was almost the only sugar available to the pioneers. In 1910 census records begin to list maple syrup as well, indicating the change from a pioneer necessity to a modern luxury. Production of maple products in 1950 was less than 14 per cent of that for the peak year of 1860.



Stands of sugar maple and beech-sugar maple originally covered a large percentage of the upland areas of the watershed. As they occurred on the best agricultural soils, a large proportion of the original forest has been cleared. However, these are still among the most abundant and most valuable cover types on the Credit Watershed.



Aspen, a tree of low value, is often the first species to come in after clear-cutting, fire or over-grazing. It should be replaced as rapidly as possible with more valuable species.



The black ash—white elm—red maple type occupies the wetter areas, in many hardwood swamps.

CHAPTER 2

SURVEY OF PRESENT WOODLAND

1. SURVEY METHODS

Aerial photographs, each covering about 1,000 acres, were provided to the forestry party, and mapping in the field was done directly on the photographs. Each area of woodland, scrubland, swamp and rough land was visited and described as to acreage, cover type, presence of grazing, reproduction, density and average diameter at breast height.

Each woodlot was classified as hardwood, coniferous or mixed. The term "hardwood" is used to denote all broad-leaved trees regardless of their physical hardness. A woodlot in which 80 per cent or more of the trees are hardwoods is called a hardwood stand; one in which 80 per cent or more of the trees are conifers is called a coniferous stand; and all other stands are classed as mixedwood.

Plantations were likewise examined and records made of method of planting, approximate age, care, damage and survival.

Land suitable for reforestation was mapped, and descriptions prepared in some detail for the larger areas.

2. FOREST COVER TYPES

The term "forest cover type" refers to those combinations of tree species now occupying the ground, with no implication as to whether these types are temporary or permanent.

- (a) The upland areas of most of the Credit Watershed are characterized by sugar maple and beech—sugar maple stands which are the common climax type for the Great Lakes-St. Lawrence Forest Region. These types make up 31.7 per cent of the total woodland of the watershed. These cover types once extended over most of the upland areas. As they occupied the most desirable agricultural land, a large proportion of these stands were cleared.
- (b) The presence of oak types near the mouth of the river indicates that a small area along Lake Ontario may be included in the more southern Deciduous Forest Region.
- (c) Aspen, which is a temporary type of low commercial value, now occupies 23.6 per cent of the woodland due to clear-cutting or other opening up of the forest. Much of this area could be occupied by more valuable forest species.
- (d) The other common types are characteristic of swamp areas. White cedar, elm, and black ash-white elm swamps produce a forest crop on lands not suited for other use, and at the same time form valuable water storage areas.

- (e) The twenty-two cover types making up the remaining 9 per cent of the forest cover indicate the great variety of local climatic, topographic and soil conditions found in the Credit Watershed.

3. CONDITION OF WOODLANDS

Woodland within the watershed comprises 35,030 acres, which is 16.3 per cent of the total area of 214,387 acres. Of this woodland, 59.3 per cent is classed as hardwood stands, 32.7 per cent as mixedwood, and only 8.0 per cent as coniferous. This indicates that even the cedar type has a considerable admixture of swamp hardwoods. As upland conifers and mixedwood types are relatively limited, the supply of softwood sawlogs from the area is very small.

The survey indicates that 81.0 per cent of the woodland is uneven-aged, and therefore might readily become a source of continuous revenue to the owner. However, this continuous production will not last for long unless there is an improvement in natural regeneration in the woodlots. Over half the woodland area shows virtually no regeneration. Less than six per cent showed regeneration which could be classed as "good" to "excellent". One obvious reason for this condition is the fact that approximately half the woodlots are grazed.

4. SCRUBLANDS

In all 5,033 acres in the watershed are covered with tree species which never attain commercial size. The most common species are scrub willow and dogwood on poorly drained sites and hawthorn and sumach on dry sites. Much of this area is located on abandoned farmland or neglected pasture. In some cases this can be restored through drainage or through eradication of dry scrub. However, where such restoration does not seem economically feasible, the area should be returned to tree cover through systematic replacement of the scrub species with more valuable types.

CHAPTER 3

SURVEY OF WOOD-USING INDUSTRIES

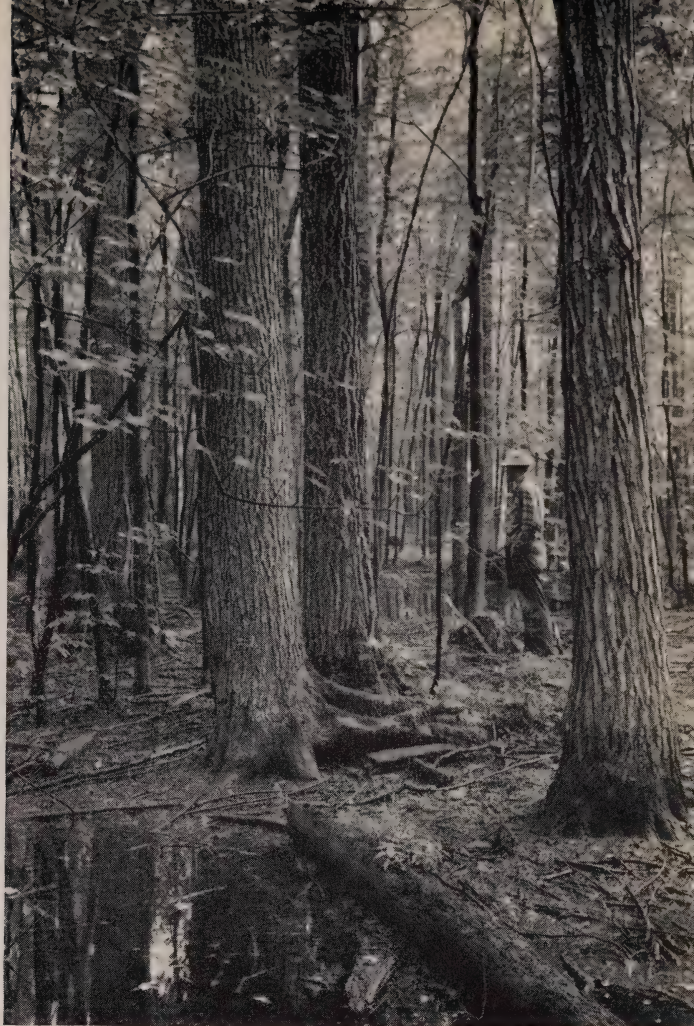
The present survey covers sawmills, lumber yards, fuelwood and posts, maple syrup, and wood product manufacturers in or very close to the Credit Watershed.

1. SAWMILLING

At the time of the survey there were six small mills operating on the watershed and four others within four miles of the watershed boundary, one powered by an old-time steam engine and the rest by gasoline or diesel engines.

All mills but one are permanently installed and approximately half the present cut is custom sawing for local farmers to provide lumber for their own use or local sale. Most of the millowners' lumber is also sold locally, although one mill ships a small amount to the U.S.A.

The white elm type is common on sites which are seasonally wet but become dry in mid-summer.



On drier sites hawthorn takes over abandoned fields. Unless these areas are reforested they will produce nothing of value for many years to come.



Poorly drained pasture may become covered with willow scrub. Unless drainage and pasture improvement are feasible these areas should be fenced and returned to forest cover.



As there are no growth rate, yield or inventory data for Southern Ontario woodlots, it is extremely difficult to determine how the current annual cutting rate compares with the annual growth. With the present lack of management, it is likely that the woodland of the watershed is not producing more than the present meagre annual cut. With proper management it seems certain that the present woodland and submarginal land on the Credit Watershed could produce sufficient timber not only for full year-round employment of all present milling equipment but also for a considerable expansion in the industry.

2. LUMBER YARDS

Seventeen firms selling dressed lumber and builders' supplies are located in the Credit area, the main concentration being in the south where post-war housing developments provide a ready market. Few of these companies were in business in the area before the war. Their market is almost entirely local but practically none of their supplies are from local sources.

3. FUELWOOD AND POSTS

The total volume of this material cut on the watershed cannot be readily estimated since most of it is used by the woodlot owner or his neighbours and does not appear on the market. Much of the fuelwood is produced incidentally from tops left in sawlog cutting and not as a separate operation. In the southern part of the watershed, where woodlots are scarce, the majority of the residents now burn coal or oil.

Because of the convenience of carload purchases and lack of an assured local supply, dealers in Cooksville and Clarkson bring in slabs and cordwood from Haliburton and Muskoka. Similarly, a Cooksville dealer purchases his cedar posts in Meaford.

4. MAPLE PRODUCTS

The production of maple syrup on the Credit Watershed has dwindled in recent years until only the occasional sugar house remains. Syrup production is time-consuming work and present high labour costs are undoubtedly a major factor in the abandonment of this industry by many farmers.

5. LOCAL WOOD-USING INDUSTRIES

Twenty-four wood-using plants in or near the Credit Watershed were studied during the survey.

(a) FURNITURE FACTORIES—8.

These, all in the southern part of the area close to markets and transportation facilities, produce household furniture, children's furniture, school desks, and also cupboards, show cases and counters. Some species such as oak, walnut, western white pine and parana pine are imported, but the bulk of the lumber used is of Canadian origin. The Canadian woods used are white pine, B. C. fir, poplar, white and yellow birch, basswood, hard maple, black ash. Most of these species are found in the Credit Watershed but none of the factories reported purchases of local lumber.

(b) SASH AND DOOR—11.

Most of the eleven companies producing these products are close to the rapidly developing building projects along Lake Ontario, and many have started business since the war. Although a variety of woods is used to some extent, their main materials are the native or imported pines. Very little of this is from local woodlots.

(c) MISCELLANEOUS WOOD MANUFACTURING—5.

The five plants studied produce such varied products as boat seats, wooden heels, baskets, air registers and wooden tanks. Only one firm reports using any appreciable quantity of local wood, although all but one use some species which grow or could be grown in the area.

CHAPTER 4

FOREST CONSERVATION MEASURES IN PROGRESS

1. DEMONSTRATION WOODLOTS

The most important measure which could be taken for forest conservation would be the improved management of present woodlots. An early effort in this direction was the establishment by the Department of Lands and Forests of demonstration woodlots. These are areas of private woodland on which the owners have agreed to follow prescribed methods of woodlot management and to permit access to the area by interested persons. Fourteen have been established in the Credit Watershed, distributed as follows:

Toronto Township.....	3
Esquesing Township.....	3
Chinguacousy Township.....	2
Caledon Township.....	6

Well-conducted demonstrations could exert an influence for proper management in the surrounding area. Unfortunately, some of these demonstration woodlots have been cut over when the property changed hands, and others have been neglected so that they no longer serve their original purpose.

2. TREE FARMS

In the past few years a movement has been under way to recognize well-managed forest properties as Certified Tree Farms. With the sponsorship of several organizations interested in better forestry, the Canadian Forestry Association in 1953 formed a National Tree Farm Committee to recognize with a suitable sign and certificate those owners who agree to maintain their land for growing forest crops, protect the land adequately, agree that cutting practices will be satisfactory to ensure forest crops, and permit inspection by Committee foresters. The first private Tree Farm to be certified in Ontario was a 325-acre property at Alton on the Credit River.



The wooded slopes of the escarpment not only add to the beauty of the Credit Valley but make this rough terrain productive in terms of wood for industry and clear spring water for the river.

Several Conservation Authorities have become co-sponsors of the Tree Farm movement in their areas, and it is recommended that the Credit Valley Conservation Authority give its support to this movement.

3. PRIVATE PLANTING

In the Credit Watershed there are 120 private plantations, covering 703 acres. Considering that this watershed does not contain large, easily-planted, sandy areas such as those which have stimulated planting in other parts of the province, this represents a worthwhile start in reforestation.

4. COUNTY FORESTS

The only county plantation within the watershed is a corner of the Peacock Tract of the Wellington County Forest.

5. TREE-CUTTING BY-LAWS

Under The Trees Conservation Act of 1946 and its successor The Trees Act (R.S.O. 1950, c. 399) twenty-one counties have passed by-laws to restrict and regulate the cutting of trees. These by-laws do not interfere with the right of the owner to cut material for his own domestic use, but specify certain diameters below which trees may not be cut for sale.

The limits provided by the counties covering the Credit Watershed are given below.

County	Diameter Limits in Inches						
	5	6	7	8	10	12	14
Dufferin.....	Cedar	Cedar	Cedar	Poplar White Birch	Bass- wood	Others	Others
Halton.....							
Peel.....							
Wellington.....	Cedar				Balsam Fir Poplar Ironwo'd White Birch	Others	

All measurements are taken at 18 inches above ground. In general these limits are too low, and greater uniformity between counties would be desirable.

Private individuals and municipalities may obtain advice and assistance in reforestation and woodlot management through the Department of Lands and Forests' Zone Foresters at Maple for Peel County, at Angus for Dufferin

County, and at Hespeler for Halton and Wellington Counties. The Zone Forester also assists in the establishment of Authority forests, County forests, demonstration and school plots and demonstration woodlots.

The forest tree nurseries at St. Williams and Midhurst are the chief sources of planting stock for this area.

6. 4-H CLUBS

These clubs are organized by the Ontario Department of Agriculture assisted by the Department of Lands and Forests and must be sponsored by an organization interested in the improvement of woodland and reforestation.

Sponsorship of these clubs in the Credit Watershed would be a worthwhile project for the Authority.

CHAPTER 5

A CREDIT AUTHORITY FOREST CONSERVATION PROGRAM

The activities through which the Authority may further forest conservation fall into three broad categories. In woodlot improvement demonstrations or private planting the Authority may co-operate with private landowners. In larger areas needing reforestation or management the Authority may acquire land and manage it directly. Through public meetings, field days and publications the Authority may educate and encourage residents of the Credit Watershed to practise conservation on their own lands.

Areas recommended as suitable for private reforestation and public forest conservation measures are shown on the folded map in the back of the report.

1. WOODLOT IMPROVEMENT PROJECTS

For most persons the best lesson in conservation is field observation of specific examples of the present abuses and efforts to remedy them. Woodlots chosen as illustrations must be near good roads and should be marked with large signs giving considerable detail of conditions and improvement measures in progress. Roadside or other parking facilities would have to be provided so that visitors could take the full time necessary for inspection without interfering with other traffic.

Some of the proposed improvements are experimental in nature. From the owner's point of view the whole program may seem to be of unproved value. On these sample areas the Conservation Authority is therefore fully justified in assuming part of the actual woodlot improvement cost as well as the cost of signs and parking facilities.

To use a private woodlot in this way for educational purposes would require a definite agreement with the owner to ensure that the proposed improvements were carried out, and that the benefits of this work would not be lost by a change of ownership or of attitude on the owner's part. In addition a detailed record



Steep slopes and stony land unsuited to agriculture can be used profitably to grow trees.



Farms abandoned because the soil is too stony could again grow good crops of trees.



Lack of cover results in serious erosion. Reforestation of this land will induce rain and melt-water to enter the soil and feed headwater springs instead of running off as destructive surface flow.

of costs and returns would be necessary to show other owners that it would pay them to adopt similar practices in their own woodlots.

2. PRIVATE REFORESTATION

On many farms, even in the better farming areas, there are small tracts which, because of steep slopes, stoniness or poor drainage, would be better in tree cover. A total of 5,327 acres of such land requiring private reforestation were mapped in the recent survey. These tracts are not suitable for public acquisition and management, but the effect of reforestation on control of run-off, improved summer stream flow and stabilization of wood-using industry justifies public assistance in such work. These areas have not been privately reforested heretofore because the owner has some other minor use for the area, because he is discouraged by the long period between planting and harvest of a forest crop or more commonly simply because of inertia on his part.

The interest of private owners in reforestation may be fostered in several ways. Public education, such as that now carried out by the Zone Forester in the district, can be furthered by the Authority. In addition, direct assistance to private planting can be given.

The Credit Valley Conservation Authority has purchased a tree-planter which it rents to private owners at a nominal cost. Where rough ground makes hand planting necessary, some Authorities refund \$10 per acre if inspection shows that planting has been done carefully and the plantation is adequately protected from livestock.

The Department of Lands and Forests charges \$14 per thousand for Scotch pine and \$10 per thousand for other planting stock to be used for reforestation purposes.

3. CREDIT AUTHORITY FOREST

When large areas (100 acres or more) require reforestation or woodland management, the task is frequently too great for private initiative. In such cases acquisition by the Authority is recommended. This is particularly desirable where these forests form natural water-storage areas which decrease the severity of floods and maintain the summer flow of streams. Other tracts which at present lie idle or produce only sparse, droughty pasture can again be made to add to the economy of the area through reforestation.

In all 4,743 acres are recommended for acquisition by the Credit Valley Conservation Authority. Of this total, 3,000 acres are open lands, 1,632 acres have some form of tree cover, 108 acres are scrub, and 3 acres are water. A minimum of land in better land classes has been recommended for reforestation. However, it was impossible to omit such land entirely when it formed a small part of a lot which was composed mainly of a poorer type of soil.

Because of the rougher topography in the northern part of the watershed, the recommended areas are concentrated in the townships of Mono, East Garafraxa, Erin and Caledon. As most of the streams in the watershed rise in

these townships, that is also the area in which reforestation will have most effect on stream flow.

4. THE AUTHORITY AND CONSERVATION EDUCATION

Many agencies at present do, or can, engage in conservation education. The Authority can supply opportunities and materials to encourage and enlarge these activities. Wall maps, literature, conservation pictures and conservation lectures supplied to the schools will help to give geography, history and conservation practices a local significance. Building up a library of slides on local conservation problems and accomplishments would be of great assistance to speakers. Organization of public meetings and contact with individuals and groups such as farm forums will gain support for both private and public conservation efforts. Landowners should be encouraged to make greater use of the services available from the Conservation Authority and from officers of the Department of Lands and Forests and the Department of Agriculture.

The most effective educational activity is actual participation in or field observation of conservation activities. Tree planting days, group visits to woodlot improvement projects and conducted tours over a well-organized conservation trail could all be sponsored by the Conservation Authority. These activities would all stimulate individual action on forest conservation measures, such as those described in the following chapter, which cannot be carried out directly by the Authority.

CHAPTER 6

FURTHER FOREST CONSERVATION MEASURES REQUIRED

1. WOODLAND MANAGEMENT

The woodlot inventory shows that there are 35,030 acres of woodland on the Credit Watershed. Practically all of this area requires better management. While experimentation is desirable to determine the best method of handling certain problems, the general principles of woodlot management have been known for years but have not been applied. A free advisory service is available from the Zone Foresters, but is not sufficiently used, and a readily understood pamphlet on "The Farm Woodlot" can be obtained from the Department of Lands and Forests.

Owners of large woodlots might be encouraged to undertake thinnings and improvement cutting if equipment or trained crews were available at reasonable cost. The Authority should consider offering such a service. As an alternative, the Authority might offer a subsidy for each acre improved to its specifications and found satisfactory on inspection by the Authority's officers.

2. ELIMINATION OF WOODLAND GRAZING

This is not a new theme. As early as 1908 the Ontario Legislature, in providing an exemption of one acre in ten used for forestry purposes, included a "no grazing" clause. There are a number of reasons for the widespread

practice of allowing woodland grazing. The woodlot has always been considered a pasture field even though the value of woodland pasture is low compared to cleared land. The reason for its low carrying capacity is partly because grass grown in the shade is not nearly as high in food value as that grown in full sunlight. The following statement in respect to woodland pasture has been made by leaders in agriculture: "On the whole, the opinion of the Agronomists is that, on the average, woodland pasture will produce about one-sixth the quantity of pasturage, and the quality will be about one-half as good as that of the improved pasture". Weeds are usually prolific in wooded pastures, often smothering most of the grass.

If shade is required for stock, it may be desirable to leave a portion of the woodlot in the pasture when fencing the woodlot. Another solution is to establish small groves of fast-growing hardwoods which can be fenced temporarily until the trees are sufficiently tall that browsing will not damage crown growth. Where springs or streams that supply water for the stock are situated in the woodlot, access may be made to a trough near the spring and the area should be fenced to prevent trampling.

3. FOREST FIRE PROTECTION

The first step in fire control is fire prevention, and the best assurance of prevention is an enlightened public opinion which will make every member of the rural community conscious of the seriousness of the fire damage and of his duty as a citizen to do all he can to prevent it. The farmer can prevent most fires in farm woodlots if he exercises the same care that he does around his home and buildings. It is particularly necessary to exercise such care in areas which have been cut recently, since the accumulation of slash creates a serious fire hazard. Close utilization of tops and the scattering of slash so that it lies close to the moist ground and rots faster will help to reduce this danger.

4. PROTECTION FROM INSECTS AND DISEASES

In projects such as the public and private reforestation, careful consideration should be given to the prevention of outbreaks of insects or tree diseases and adequate arrangements made for the immediate application of control measures when these become necessary.

5. WINDBREAKS AND SHELTERBELTS

Experience has shown that windbreaks are an asset to any farm, that their adverse effects, if any, are local and easily remedied and that in many areas they are essential to the control of soil erosion by wind. It is therefore recommended that the Authority encourage the establishment of windbreaks by private owners in every way.

6. SNOW FENCES

Trees are being used successfully as snow fences in Ontario by the Department of Highways, by railways and by a number of counties. Every encouragement should be given to the establishment of such snow fences in place of the removable type of lath fence now in use.

CHAPTER 7

THE HARVEST AND MARKETING OF THE WOODLAND PRODUCT

This chapter points out some of the things that the owner needs to know in order to realize that woodlot conservation is a worthwhile business.

1. THE TIMBER HARVEST

Harvesting of timber involves four distinct operations: estimation of volume, cutting, skidding and hauling. The owner may perform all operations, selling his logs at the mill; he may cut and skid the logs, selling them at the roadside; or he may sell his timber on the stump.

(a) ESTIMATING

Estimation of timber may be done either in the tree (cruising) or in the log after cutting (scaling).

One example may illustrate the value of a tallied cruise. Some years ago in competitive bidding for 87 acres of woodland one operator estimated a stand, by tallying every merchantable tree, to be 700,000 board feet; the chief log buyer for a large furniture manufacturer estimated 350,000 board feet; another operator estimated 100,000 board feet. The actual cut from the stand was 746,000 board feet. Before selling standing timber it would pay the owner to make a tallied cruise or, if necessary, to hire professional assistance for this purpose.

Similarly when selling logs the owner or his agent should assist in their measurement, try to understand the allowance which must be made for defects, and assure himself that he is being fairly treated.

(b) CUTTING AND SKIDDING

With recent improvements, power saws have become more popular where there is any large quantity of timber to be cut. Power saws require a considerable capital outlay, but with proper maintenance production is almost trebled.

The horse is still the most adaptable medium of power for transporting logs from the tree to the roadway. Where conditions are not too difficult a caterpillar tractor or winch is often used.

(c) HAULING

Truck hauling has increased the distance from which mills can secure their logs. Cost per thousand board feet hauled depends largely on distance. Thus, while grade 1 logs might be hauled up to 50 miles, the lower value of other logs might limit practical hauling distance to 15 or 20 miles.



Sawmilling in the Credit Watershed is mainly a part-time occupation for farmers and others who run their mills a few days to a few weeks each year.



Although diameter limit regulations restrict the slashing of woodlots for fuelwood, there is still much material available from tops and branches, and from defective trees which should be removed in woodlot improvement.

While actual figures will vary greatly, the example below will suggest the change in log value at various stages.

Value of logs in the tree (stumpage).....	\$28.00 per M bd. ft.
Making logs from tree.....	8.00 per M bd. ft.
Skidding logs to road.....	6.00 per M bd. ft.
Hauling logs to mill.....	8.00 per M bd. ft.
Value of logs in millyard.....	<u>\$50.00 per M bd. ft.</u>

2. TIMBER SALES

(a) OUTRIGHT SALE OF WOODLOT

Frequently a saw-miller finds the simplest procedure is to buy the woodlot or farm outright. In this case the former owner has no further interest in the land. The practice of slashing such woodlots and leaving them to become tax-delinquent was a legitimate cause for community concern. Where tree cutting by-laws are rigidly enforced this abuse should be kept under control.

(b) SALE OF CUTTING RIGHTS

Under this method the owner sells the right to cut all timber of certain species down to a certain diameter; or the trees to be cut may be marked in advance and the sale made on this basis. Often only a very vague word-of-mouth agreement is made and misunderstandings are common. A simple written agreement such as suggested later in this chapter would avoid this confusion.

A lump sum method of payment is often used on such sales, based upon a volume estimate by the buyer. As mentioned in the section on cruising, the volume estimates of different bidders may vary considerably. The seller is therefore advised to consult the list of buyers of woodland products in the hands of the Zone Foresters and to obtain competitive bids from as many buyers as possible. On lump sum purchases the buyer takes all the risk as to accuracy of estimate and quality of timber.

Selling the standing timber at a rate per thousand feet removes the uncertainty of volume estimates and requires measurement of the logs after cutting. Two uncertainties remain, the log rule to be used in measurement and the assignment of logs to different grades which differ in prices per thousand board feet. For provincial government transactions the new Ontario log rule is now required; but for private sales there is no set standard, the Doyle rule being most commonly used. The woodlot owner seldom knows the problems of processing logs into lumber sufficiently well to understand fully why the buyer assigns some logs to lower grades. Possible arguments and ill-feeling on this account are factors in making some buyers prefer lump-sum purchase. The woodlot owner must decide whether to accept volume and grade risks in the hope of getting a better price by selling on a log measurement basis.

In the event that he chooses to be paid on a volume-removed basis, just what the buyer intends to cut and pay for should be absolutely clear. Only the best trees might be removed and it is possible that only the best logs from

these trees might be taken. This leaves the owner with many poor quality logs which he cannot readily sell and with some poor trees standing which he wanted cut. The volume actually paid for might be small and the woodlot owner's total realization on the transaction might be less than he would have received had he accepted payment in a lump sum.

No matter which of these two methods is chosen, a written Timber Sales Contract should cover the transaction. It should set forth all the details necessary as to prices, species, sizes, rights granted to the buyers, limiting dates, times of payment, and so on.

(c) OWNER-MADE LOGS

The woodlot owner who has decided to realize not only the value of his woodland product but also the additional labour income derived from its harvest prefers to take payment at a price per thousand board feet for logs placed on skids at the roadway or logs delivered to the mill. Here again the securing of competitive bids and a clear understanding with the buyer regarding log grade will avoid any feeling of unfairness in the deal. An owner who simply arrives at the mill with a load of logs may feel that he has to accept the offered price even though he is dissatisfied.

3. LOG PRICE AND GRADES

A woodlot owner may wonder when the sale price at the mill for "select grade" hard maple in two-inch stock is \$200 per thousand board feet and at the same time the price he receives for standing maple may average only \$60 per thousand for good trees. But he should also note that No. 3 Common is selling for about the same price as he is paid for his standing timber and this grade is not paying the mill its costs. Also select grades represent only a small percentage of the mill run, generally less than 15 per cent in hardwoods. The operator has to handle, manufacture and market large quantities of timber of marginal and submarginal sale value in order to offer to the market the small percentage of high-grade stock which puts the economic picture of the operation in a better light; higher grades must carry the burden of lower grades.

Orderly marketing of woodland products is to the advantage of the woodlot owner, the sawmill operator, and the ultimate industrial consumer.





THE CREDIT RIVER
AT NORVAL.

4

WATER

CHAPTER 1

GENERAL DESCRIPTION OF THE WATERSHED

1. SHAPE AND DIMENSIONS

The main axis of the watershed area lies in a north-westerly, south-easterly direction and is adjacent to the Etobicoke and Humber Watersheds on the east, the Nottawasaga Watershed on the north, the Grand on the west and Oakville Creek Watershed on its south-westerly limit. The Credit Watershed with its great natural beauty is an asset to all the surrounding watershed areas and particularly the more densely populated ones included in Toronto Metropolitan Region Conservation Authority group.

In addition to the actual watershed area, the Credit Authority includes representatives of two areas in Toronto Township fronting on Lake Ontario and located on either side of the Credit Watershed.

North of Georgetown the watershed is rugged and the lateral slopes are rarely less than 25 feet to the mile and between Cataract and Inglewood they are as much as 500 feet in a quarter of a mile.

Below the escarpment and south of Georgetown the topography is not so rugged and varies from rolling to plain towards Lake Ontario. Lateral slopes vary from about 20 to 125 feet per mile on the average.

Truck crop farmers are using river water for irrigating to increase their yields and an expansion of this type of farming is to be expected with a corresponding demand for water from the river for irrigation.

2. THE RIVER AND MAIN TRIBUTARIES

(a) COURSES

The main branch of the Credit River rises in a swamp $2\frac{1}{2}$ miles north-east of Orangeville. It skirts the easterly limit of the town and follows an irregular course in a general south-easterly direction to Lake Ontario.

The most important tributary streams are Shaws Creek, the West Credit, Caledon Creek, the East Credit and Silver Creek with its tributary, Black Creek.

(b) GRADIENTS

The gradient of the main Credit is heavy throughout its course, the fall from the headwaters to Lake Ontario being 1,185 feet or an average of 21.4 feet to the mile. The central section which appears to flatten out is actually 16 feet to the mile. The southerly section to Lake Ontario is about 23 feet and the northerly section to headwaters about 27 feet to the mile. The greatest fall in this section is 230 feet in the 2.4 mile stretch between Cataract and Credit Forks which is equivalent to a gradient of 96 feet to the mile. The gradient of the tributaries is even greater than corresponding stretches of the main river.

3. THE RIVER VALLEY

The watershed above the Forks is under forest cover to a greater extent than most valleys; and this factor, together with the groundflow through the pervious moraine, results in a remarkably well-sustained flow of clear cold water; so much so that gauge records at Cataract show summer flows sometimes greater than those at Erindale, near the mouth of the river.

As previously shown, the river grades are steep, and summer flows, particularly in the upper reaches, well maintained. These factors led to intensive use of the stream for power and rarely was a road crossing not the site of a mill. Of these, few remain, and few of these continue to use water power. In some cases it would be feasible to restore these dams for recreational use, although in most of them much of the pond area has been silted up.

CHAPTER 2

FLOODS

1. HISTORY OF FLOODS

The earliest known reference to floods on the Credit River concerns the building of bridges and Augustus Jones, Provincial Deputy Surveyor of Upper Canada, wrote a report on the 24th of April, 1796, which leaves no doubt in the mind of the reader, whether of his day or of the present, that he regarded floods on the Credit as annual events, threatening destruction to any bridge that was not both well placed and strongly built.

During the earlier half of the nineteenth century, the newspapers seldom recorded the details of even the most destructive of floods. Beginning about 1850, and from that time on, they gave increasing attention to reports of damage caused by floods and became the best source of information regarding their frequency and severity.

A surprise thaw, rain, and flood, "equal to our spring freshets", occurred pretty generally over Ontario early in December, 1873. A dispatch from Meadowvale, written on the 4th of December, states that the ice broke up, a temporary railway bridge was carried away, some damage was done to the dam of Messrs. Gooderham and Worts, and "a large jam of ice and timber passed down the river about ten this morning". Much greater damage at the same time was reported from other parts of western Ontario.

Two reports from points on the Credit River indicate severe and widespread damage without specifying the precise location of the damaged property.

Four further floods are known to have occurred on the Credit between 1878 and 1900.

In the flood of March 7, 1910, a part of the newly-constructed power plant dam at Erindale was washed out "by an unexpected flow of ice". No other serious damage seems to have been done.

Heavy rains occurred on the morning of March 10, 1911, causing an ice jam near Meadowvale that seriously threatened the dam at that point, "one of the largest on the Credit River, it being about fifteen feet high". Although the dam escaped damage, two men engaged in preventing such damage were swept into the river and drowned.

The flood of April 6 and 7, 1912, is described as very severe.

The year 1937, that brought disastrous floods to western Ontario, was marked by two floods on the Credit. The first, on January 14, occurred at Alton, where the river "rose to flood heights" and the second flood was the result of a heavy fall of rain on February 21, when two and a half inches of rain fell in four hours.

The next serious flooding on the Credit came on March 17, 1942, the result of a one-and-a-half-inch rainfall. Houston's dam, at Alton, was again swept



The flood of April 5, 1950, reached a peak of twelve feet above normal, and is here shown flowing over the road and isolating the bridge at Churchville, where thirty homes were surrounded and the main street was under three feet of water.

away; an electric power plant at Streetsville was forced to shut down; many highways were washed out or overflowed; at least one bridge was lifted from its abutments at Erin; and considerable damage to stored goods was caused by water in cellars and basements.

The village of Glen Williams experienced a sudden and disastrous flood on March 7, 1946. Unusually mild weather followed by heavy rain led to the break-up of the ice on the pond above the dam of the Beaumont Knitting Mills.

A severe flood occurred on April 4, 1950, when a considerable part of the village of Alton was inundated. One dam was broken, and two or three others threatened by overflowing water.

On April 22, 1952, at Inglewood, "a 10-inch torrent caused by a two-hour rain, resulted in the flooding of the Inglewood Hotel, the library, and several cellars, and a major washout of a C.N.R. and C.P.R. branch line crossing here".

An unusually prolonged and severe series of floods occurred throughout Southern Ontario between February 15 and March 2, 1954, and the flooding was almost continuous from February 15 to 23.

During Tuesday afternoon the water at Churchville rose three feet in an hour until, in the part of Churchville known as Martin's Camp, twenty-five homes stood in five feet of water. During the ensuing week the occupants of these homes were given temporary shelter on higher ground. At Meadowvale, several homes were wholly or partly surrounded by water, as an ice jam formed at the bridge near the old mill.

The flood on the Credit River that resulted from "Hurricane Hazel", while not so disastrous as the corresponding flood on the adjacent Humber, was, nevertheless, very severe. Part of the watershed was visited on October 19, when damage was noted at many points, and there were indications that the flows in the lower part of the river had been very heavy. On the whole, however, the damage observed was on the scale of a spring freshet and not of a major disaster, though at Churchville water rose higher than any previous level and the residents in Martin's Camp suffered severely.

The record includes 54 floods over a period of 160 years; and it seems highly probable that a considerable number of floods have taken place of which no record has been found. These 54 known floods have occurred in 40 out of the total of 160 years. There are accordingly, in that space of time, 120 years in which there is no known record of flooding on the Credit River.

2. CAUSES OF FLOODING

Precipitation is the source of all stream flow and run-off and to a large degree the stream flow characteristics are determined by this factor. However, there are many other factors which influence the amount and rate of run-off and degree of flooding which may be grouped into four classifications as follows:

- (a) Geophysical, which are more or less permanent;

- (b) Climatic, which are variable;
- (c) Ice jams;
- (d) Encroachments.

3. REMEDIAL MEASURES FOR FLOOD CONTROL

(a) CONSERVATION MEASURES

The conservation measures generally employed to control floods are:

- (1) Proper land use practices;
- (2) Reforestation;
- (3) Reservoir storage.

(b) EXPEDIENTS

- (1) Channel improvement;
- (2) Dikes;
- (3) Diversions.

Channel improvement, dikes and diversions are classified as expedients and are not recommended when other conservation methods are possible and practical.

CHAPTER 3

HYDROLOGY

1. PRECIPITATION, RUN-OFF AND STREAM FLOW

Precipitation is the condensation of moisture from the atmosphere which appears mainly in the form of rain and snow and occasionally in the form of hail, sleet or dew. Precipitation also occurs to a small extent from the condensation of fog. The amount of precipitation is usually expressed as depth of water in inches.

Run-off is the amount of water a drainage area supplies to the open streams and, in a broad sense, is the excess of precipitation over evaporation, transpiration and deep seepage. The rate of run-off is expressed in cubic feet per second per square mile (c.s.m.). Run-off is termed stream flow when it reaches a defined watercourse.

Stream flow consists of surface flow and ground water which is constantly entering the stream channel along its full course. Surface flow is that portion of rainfall, melted snow or ice which reaches the stream channels directly by flowing over the ground surface.

The ground water flow (percolation) to the stream is going on continuously and is responsible for maintaining the stream flow during periods of drought.

2. MEASUREMENT OF PRECIPITATION

The stations available to determine the amount of precipitation on the Credit Watershed are Melville, Alton, Georgetown, Alloa and Port Credit located within the watershed and the adjacent stations, Brampton, Malton, Snelgrove, Hornby and Clarkson. Malton is the only Class I station, the remainder being either Class II or III.

(a) THE OCTOBER 14-15, 1954, STORM

On October 15, 1954, south-central Ontario was struck by a severe storm known as Hurricane Hazel. The heavy rainfalls and high winds that accompanied the storm and the flooding which followed caused serious loss of life and extensive property damage.

The storm centre apparently passed to the east of the Credit Watershed as indicated by the maximum 48-hour rainfall of 8.41 inches recorded at Snelgrove just north of the Town of Brampton. This storm might just as well have passed up the Credit Valley.

The average rainfall over the whole watershed amounted to 6.72 inches. For the area above the Cataract gauge (81.96 sq. mi.) the average rainfall was 5.49 inches and for the area between the Cataract and Erindale gauges (238.5 sq. mi.) 7.07 inches.

3. MEASUREMENT OF STREAM FLOW AND RUN-OFF

There are two manually read hydrometric gauges on the Credit River, one at Cataract with continuous records dating from 1915 and the other at Erindale with continuous records dating from 1945.

4. HYDROGRAPHS

The Hydrograph is a correct expression of the detailed run-off of a stream, resulting from all the varying physical conditions which have occurred on the drainage area above the gauging station previous to the time which it represents.

CHAPTER 4

THE FLOOD PROBLEM

1. GENERAL

The Credit River, in common with most rivers of Southern Ontario, has high spring flows which cause damage and inconvenience along its valley. The river's flood plain, however, has not been encroached upon to the extent that others have and damage is consequently less.

2. FACTORS CONTRIBUTING TO THE PROBLEM

The stream gradients and lateral slopes of the Credit Watershed are very high, particularly in the upper reaches, and are such as would produce a high

rate of run-off. On the other hand, the nature of soils, vegetative cover and natural storage areas on the whole tend to retard run-off and to a large degree offset the effect of the steep gradients.

Flooding along the Credit Valley in most cases results from ice jams which restrict the natural channels and force the water out over the surrounding low-lying land. During the winter months large volumes of ice are formed in the quiet open water stretches of the river which are broken up and carried downstream at the time of a break-up. These masses are further strengthened by frazil ice which is formed in the rapid stretches of the river.

3. PROPOSED REMEDIAL WORK AND COSTS

When conditions are suitable flood control by means of storage reservoirs is superior to the other methods since it provides other benefits and permits the full use of the water.

The places most frequently flooded are Glen Williams, Churchville and Meadowvale and to a lesser extent, Norval and Streetsville. The flooding at Norval and Streetsville can be taken care of locally at small cost but more extensive work is required at Glen Williams, Churchville and Meadowvale to correct their problems.

(a) CHURCHVILLE

Since the Martin's Park area has been expropriated by the Flood Homes and Buildings Assistance Board and reserved as conservation land, protection for this lower part is no longer required. It is proposed to construct a dike from the high ground at the north end along the river bank and across Main Street as far as the Martin Camp, thence leaving the river and continuing along a line parallel to and near the northerly limit of the Park to the high ground on the east.

(b) MEADOWVALE

A dike is proposed along the left or south-easterly side of the river with a total length of about 1,570 feet.

(c) GLEN WILLIAMS

Ice jamming at the loop and on the shoals at the lower end of the village is the major cause of flooding and it is proposed to cut off the loop by a channel 650 feet long and a bottom width of 60 feet, which is the approximate width of the present channel.

The amount of excavation is approximately 6,530 cubic yards and is believed to be all common excavation. It is not expected that channel improvement alone will prevent future flooding and it is proposed to build a dike along the south bank of the river, using the material excavated from the channel to build part of the dike.

CHAPTER 5

LOW FLOW RECORDS AND LOW FLOW PROBLEM

1. MINIMUM AND AVERAGE FLOWS

(a) AT CATARACT GAUGE—DRAINAGE AREA 81.96 SQ. MI.

The Cataract gauge has continuous records dating from May, 1915. The lowest mean daily flows on record occurred in 1946; the minimum flows being 11 c.f.s. for each of the three months of July, August and September and the mean or average for these months being 17, 17 and 16 c.f.s. respectively. The average minimum mean daily flow for the 40-year period was 17 c.f.s. for the month of August with a minimum mean monthly flow of 26 c.f.s. being recorded for this month.

(b) AT ERINDALE GAUGE—DRAINAGE AREA 320.46 SQ. MI.

The Erindale gauge has continuous records dating from 1945. This is a comparatively short term gauge but it records the driest year since 1915, namely, 1946, as indicated by the Cataract records. The lowest mean daily flows for that year were 7, 4, and 3 c.f.s. for July, August and September, respectively, with corresponding mean monthly's of 74, 59 and 49 c.f.s. The average minimum mean daily for the nine-year period was 44 c.f.s. for September with a minimum mean monthly 74 c.f.s. being recorded for this month.

2. LOW FLOW PROBLEM

Early and careful planning by the Authority and the municipalities concerned is required to ensure an adequate and sanitary supply of water for the future expansion of domestic, industrial, irrigation and recreational needs. Domestic and industrial water supplies for the lower regions will probably be pumped from Lake Ontario but for the upper and major part of the watershed it would probably be more economical to supply water from reservoirs by gravity. Multi-purpose reservoirs would also furnish widespread benefits for irrigation, increased summer flow and recreation.

3. USES OF THE RIVER

(a) DOMESTIC

At present Streetsville is the only municipality taking water directly from the river for domestic purposes. The dam at the upper end of Streetsville is used as a reservoir and supplies the needs of 2,000 people. Throughout its course, river water is used extensively to water livestock and where sanitary, it is also used by many individual residents along the river. Probably, many of the wells near the river are affected both in quantity and quality by the stream at that point.

If the river is to be used to any great extent for domestic supply then it is imperative that an acceptable minimum sustained flow be determined and that this flow be maintained at all times.

(b) INDUSTRIAL

There are many industries along the river which use river water in their processing. The tannery at Acton requires about 750,000 gallons daily and the Wool Combing Plant also takes water from the same stream. Other plants at Alton, Cheltenham, Georgetown, etc., are dependent upon river water for their operations.

The rapid industrial expansion of the southern part of the watershed is mentioned elsewhere in this report. Georgetown and Meadowvale are already planning large areas for industrial development, some of which are already assured. Other municipalities along the river will also encourage industry and it can be expected that many industries will require water from the river.

(c) IRRIGATION

An increasing amount of water is being taken from the river for irrigation. This is a recent development with the introduction of aluminum tubing, sprinklers and pump units, and can be expected to increase as population pressure in the metropolitan area makes more intensive use of the land necessary.

(d) SEWAGE DISPOSAL

The river furnishes the only means of disposal for nearly all the waste products of human and industrial activities on the watershed. This is probably the greatest single use of the river and is such as to seriously interfere with the other uses of the river and cause great concern to all those who would use it.

(e) FIRE PROTECTION

The chief requirement for this purpose is that an adequate supply is available at all times. In built-up areas it is common to have one water supply to serve all purposes but large industries often install their own fire system. In case of fires along the river, the river would be required to supply the water to fight these fires at the present time and in the future also, unless municipalities installed waterworks systems with Lake Ontario as the source of supply.

(f) WATER POWER

The physical features of the Credit River are such that water power cannot be developed economically. In spite of the inherent disadvantages of this power source there are still many mills operating along the river with one at least developing hydro-electric power for peak demand periods.

(g) RECREATION

Probably one of the most important uses of the Credit River is for recreation purposes. The rugged forest beauty of its valleys and the clear cold spring waters of its upper reaches and their proximity to the Metropolitan area all enhance its importance in this respect.

CHAPTER 6

POLLUTION

The Credit River system drains 331.5 square miles of agricultural land and also many built-up areas.

1. GENERAL EFFECTS

Pollution effects are of two kinds: those affecting public health and those which are not a hazard to human health but which are offensive to people or harmful to stock or to fish and other aquatic organisms. The first type can usually be measured by the concentration of an indicator organism (the bacillus *E. coli.*). The second type is measured in terms of poisonous compounds which may be introduced into the river and in terms of oxygen depletion and the oxygen demand. Silting has additional effects. Shifting sand bottoms are virtual aquatic deserts. Colloidal clay prevents light penetration and retards the growth of aquatic organisms, making the water unsightly and undesirable for swimming. Silt from land of good fertility may occasionally fertilize the water, producing an unsightly growth of algae. More often silt covers the normal fauna and destroys the stream for fish.

2. CONDITIONS ON THE RIVER

A reconnaissance survey was made in 1954. Three methods were used:

- (a) Water samples at 28 stations tested on one run by the Ontario Department of Health.
- (b) A general survey of the biological aspects of every stream course with respect to:
 - (i) Fish habitat;
 - (ii) The appearance and general condition of the stream, with particular reference to recreation purposes including swimming;
 - (iii) A detailed survey of obviously polluted areas to note the sources of pollution.
- (c) A detailed examination of the effect on the bottom fauna of the river of silting from gravel-washing operations.

The Streetsville area was not sampled at that time and the chief pollution at Streetsville probably occurs in winter.

The following summarizes the general conditions of the river at various points.

(a) ORANGEVILLE

There are several sources of industrial pollution in Orangeville, including two dairies and a woollen mill, and the wastes from various residences enter the



Silt from gravel washing plants seriously affects the fish life and the appearance of the river.



Effluent from a sewage disposal plant entering Credit River, June, 1955.



Spray line and settling basins help to reduce the amount of tannery wastes reaching the main streams.

stream, but these cannot be compared with the effect of the sewage treatment plant. Following heavy rains the treatment plant is overloaded and apparently raw sewage enters the stream.

At present the sediments from the treatment plant are pumped to drying beds in the summer and in winter an old digester is used for storage of sludge until spring. There appeared to be a shortage of sludge drying beds.

(b) ALTON

Alton is a village which has no treatment plant, and this condition is to be expected for a village of this size. However, there is gross pollution of the tributary passing through the village from several factories and many houses along the edge of the stream.

The position may be summarized as follows—

The river receives:

Raw sewage and garbage — from 2 residences

Raw sewage - - - — from 1 factory employing more than
50 persons

Drains from septic tanks — from 3 residences and 2 mills
(or raw sewage)

Garbage only - - - — from 2 residences

This tributary joins the main branch descending from Orangeville, and the pollution from Alton affects the river for at least a mile below the junction. It also completely spoils what should be a most attractive large pond.

(c) ACTON

Acton has a disposal plant using the activated sludge system and handling a maximum of about 250,000 gallons a day. The plant is considered by the Ontario Department of Health's Sanitary Engineering Division to be efficiently run. Dried sludge was being stockpiled in August, 1954, because very few farmers are prepared to make use of it.

There is no doubt that the chief pollution in this tributary comes from tannery wastes. There have been many complaints concerning these. It should, however, be remembered that most other tanneries in Ontario have either a convenient sewer or a large lake into which to pass their effluents with little or no treatment. This plant, which employs more than 400 people, has made a considerable effort to reduce the effect of the various effluents which amount to about 750,000 gallons per day.

The problem of disposal is complicated to some extent by the fact that this tannery also treats the effluent from a wool-scouring plant whose factory is adjacent to the tannery.

(d) GEORGETOWN

Pollution at Georgetown is caused by the combined effects of a disposal plant and two paper coating plants, along with various lesser industries.

(e) STREETSVILLE

Streetsville makes use of the river as a source of drinking water after treatment. The present sewage treatment plant is much overloaded, particularly in winter when the top of the flotation bed freezes.

(f) SAND AND GRAVEL PITS

There are two gravel pits which are radically affecting the condition of the river. One is at Glen Williams and the other above Cataract.

CHAPTER 7

REMEDIAL MEASURES FOR LOW FLOW AND POLLUTION

1. GENERAL

The uses of the river water and extent of pollution have been outlined and from an examination of the flow records it will be realized that the natural flow is too low and unreliable during some periods to meet the present requirements or help alleviate the pollution. Thus dams and reservoirs are to be recommended for this phase of the problem.

2. TYPES OF DAMS AND RESERVOIRS

(a) DAMS

The type of dam most suitable and the one generally used in Southern Ontario in recent years is the earth-filled gravity type structure with a central concrete section. It consists essentially of a concrete spillway section fitted with gates and valves to give the necessary discharge control flanked with earth embankments. The embankments have an impervious clay core to make them watertight and are faced with heavy rip-rap to prevent erosion from wave action and local drainage down the slopes.

(b) RESERVOIRS

Dams create artificial lakes of different types according to the purpose for which they are used; whether for recreation only, a combination of flood control and recreation or those which are used for the dual purpose of flood control and increasing subsequent low flows.

(1) *Flood control and recreation reservoirs* combine flood control with recreation. These reservoirs impound water during the spring run-off, and thereafter are emptied as soon as possible down to a determined lake level in order that vegetation will not be killed.

(2) *Flood control and summer flow reservoirs* serve the double purpose of flood control by impounding the flood waters during periods of high run-off for

subsequent release to augment the flows during periods of low run-off throughout the summer, fall and winter months. The ever-changing water level kills vegetation within the reservoir and, as it is lowered, leaves trash and a poor beach. Owing to these conditions their recreational value is greatly impaired.

(3) *Summer flow and flood control reservoirs.* The chief function of dams of this type is to provide storage for augmenting the natural stream flow throughout the summer, fall and winter months. They are operated in the same manner as the Flood Control and Summer Flow Reservoirs but the primary concern at periods of high flow is to fill the reservoir rather than to try to time the filling to provide the most effective flood control. However, with experience and a knowledge of the potential run-off from above the reservoir, substantial flood control benefits may be achieved also by timely regulation of the dam.

Since the reservoir level is progressively lowered throughout the summer the recreational value of the reservoir area is limited, but this feature of the river below the reservoir would be greatly enhanced by the sustained increased flow provided by the reservoir.

The reservoirs recommended for the Credit Watershed would be of this type.

3. POSSIBLE RESERVOIR SITES

A preliminary investigation of the possible reservoir sites was made from the topographical sheets covering the watershed area and twelve sites were selected for further field investigations. Of these, ten appeared to be feasible and the areas were surveyed and contour plans prepared. Subsequently, four of those surveyed were also eliminated for various reasons. A brief description of those investigated follows:

(a) RECOMMENDED SITES

(1) *Orangeville reservoir site*

This reservoir would occupy an area of 391 acres which at present is a swamp covered with low-grade scrub growth, mostly willow. The damsite lies about one-quarter of a mile east of Orangeville, and the flooded area extends north and east from that point.

The main dam would be about 1,550 feet long and 18 feet high, with a maximum water depth of 13 feet at the dam and it would control the run-off from a drainage area of 10.92 square miles. A side dam would be necessary at a saddle on the divide to the Nottawasaga River, but need only consist of a simple earth dike with a maximum height of ten feet, and total length of 1,250 feet.

The reservoir would have a maximum storage of 1,934 acre-feet. Strategically located, this reservoir would prevent the flooding of No. 9 Highway east of Orangeville and its controlled discharge throughout the summer would improve flow conditions and help alleviate the pollution condition existing below the Town of Orangeville.

This site is one of the most strategically located in the watershed for providing summer flow, and both construction and land acquisition costs should be low and comparable to the Luther Marsh Dam and Reservoir project on the Upper Grand River. The estimated cost of the Orangeville Dam and Reservoir is \$410,000.

(2) *Cataract reservoir site*

The Cataract reservoir appears to have the best possibilities of those studied. The wide, flat valley is not developed, except for a small group of three cheaply constructed cottages at the damsite, and land costs should be comparatively low. Some timber of merchantable size is in the second-growth swamp forest that occupies the valley floor.

A dam at the line of the road allowance between Lots 15 and 16, Caledon Township in Concession III, would have a crest length of about 850 feet, with total height of 38 feet above the stream bed and maximum water depth of 33 feet. This height will give the C.P.R. tracks along the reservoir a freeboard of 5 feet above maximum water level at the dam. The drainage area above the dam is 80.52 square miles.

The storage capacity would be about 2,573 acre-feet and would be in a good position to supply summer flow over the maximum length of river through the droughty clay plains.

Reservoir length at maximum level would be about 2.5 miles and it would cover the road between Lots 20 and 21 to a depth of 4 feet. The estimated cost of this project is \$1,180,000.

(b) SITES FOR FUTURE CONSIDERATION

(1) *Belfountain reservoir site*

The damsite for this reservoir would be located along the road between Concessions V and VI W.H.S. in Lot 10, Township of Caledon. The dam would have a crest length of 1,060 feet, a total height of 54 feet, a water depth of approximately 49 feet at the dam and a drainage area of 36.96 square miles.

When full, the reservoir would have a length of 2.2 miles, an average width of about 800 feet, a surface area of 280 acres and storage of 3,936 acre-feet. The land is covered with a good growth of timber, but little agricultural land is affected. Three cottages, of estimated value of \$3,500 each, lie below the flood line.

(2) *Silver Creek reservoir site*

This reservoir site lies on a small branch of the lowest major tributary, known locally as the West Credit, three miles above Georgetown. This tributary is heavily polluted from Acton and Georgetown, and the reservoir site is well located to provide summer flow to help alleviate this condition. Although this is one of the best natural reservoir sites in the watershed, it is doubtful that it can be used to its full capability because of the small drainage area. A 68-foot

dam is possible and storage at that height would be 6,517 acre-feet; however, the average freshet run-off of March and April from the drainage area of 13 square miles is approximately 3,000 acre-feet, so that the reservoir formed by a dam 68 feet high could only be used to its full capacity half of the time but the storage from high run-off years could be carried over and used in the lean years.

This reservoir is underdeveloped, except for some rough pasture at the lower end, and there are no structures. At the maximum dam height, the reservoir would have a length of 2.2 miles, a width at the broad lower section of 1,500 feet and a water surface area of 200 acres. The crest length of a 68-foot dam would be 1,180 feet.

(3) *Glen Williams reservoir site*

ADDENDA:		ove Glen : high.
The revised estimated cost of the Cataract dam and reservoir is \$750,800.....	p. 98, line 23 p. 100, line 6	advisable Township and total bove this
The estimated cost of the Silver Creek dam and reservoir is \$831,000.....	p. 98	1.2 miles res being capacity
would be 2,500 acre-feet.		

(4) *Georgetown reservoir site*

This reservoir site is located on the West Credit about 1½ miles below Georgetown. It is well located to provide additional flow to a heavily polluted branch, and unlike the Silver Creek Reservoir on the same stream, could be developed to its fullest capability. On the other hand, it would not alleviate the polluted condition of the stream through Georgetown.

The dam would lie along the road between Concessions IX and X, Esquesing, and would have a crest length of 1,350 feet and height of 54 feet above the present river bed. This height would bring the maximum water level to the elevation of the Georgetown sewage plant outfall.

At full stage the reservoir would cover 201 acres and hold 3,677 acre-feet of water. Much of the flooded land is pasture and scrub woodlot, but some 40 acres are in hay. The reservoir would cover the road between Concessions VIII and IX for a length of 1,400 feet to a maximum depth of 4 feet, and surround two houses east of this road, a cottage and unfinished bungalow at a total estimated value of \$9,000. No other structures would be affected. Lots 551 to 557 inclusive of the Delrex Development Ltd. project No. 339 would be affected also. This allows for a strip 100 feet wide and 10 feet above high-water level.

4. PROPOSED REMEDIAL WORK

The above six reservoir sites surveyed and found to be economical have a combined storage capacity of about 20,940 acre-feet which, in view of the potential development of this area, is barely adequate. The Orangeville and Cataract sites are the best of these sites and are recommended for early construction at a cost of \$410,000 and \$1,180,000 respectively. Also, some effort should be made to acquire the lands for the remaining sites in the near future before the land values become too high.

CHAPTER 8

CONSERVATION STORAGE

1. GENERAL

It is not possible to visualize the future requirements at the present time, but it is strongly recommended that the Authority carefully consider the available reservoir sites and take steps to purchase the lands required for the more desirable sites now. Otherwise, it is conceivable that land values could increase to such a point as to make the projects uneconomical and perhaps even impossible.

2. THE PLANNING YEAR AND OPERATION OF RESERVOIRS

The "Planning Year" as used by this Department simply divides the twelve-month period into two periods, viz.:

<i>Period A</i>	<i>Period B</i>
92 days	273 days
March, April, May	June, July, August, September, October, November, December, January, February.
Replenishing	Draft

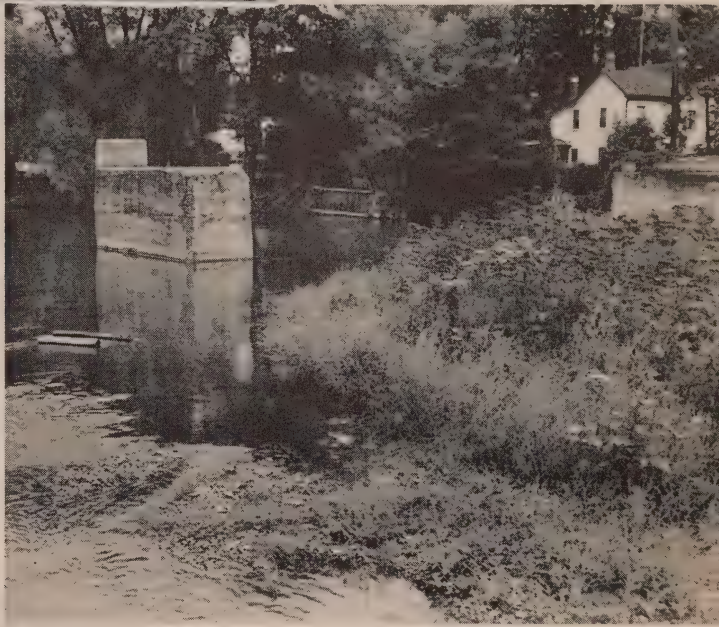
Period A—or the replenishing period is the period of high flows and practically all the flooding occurs during this time. The reservoirs would be filled to their summer flow capacity during this period and beyond, depending upon the magnitude of the spring freshet.

Period B—or the draft period includes the months during which the flows are generally low and should be increased by additional flow released from the storage reservoirs in order to maintain a minimum permissible flow.

The operation of the reservoirs would conform to this period as closely as possible, depending on the magnitude of the spring run-off and the low-flow



Churchville—The park area and buildings in the background are flooded almost annually.



Meadowdale—The Credit River at the abandoned railway line. The old bridge pier and railway embankment contribute to flooding and should be removed.



Glen Williams—This view shows the limited protection offered by the natural river bank. Spring flows readily overtop this bank and flood the roadway and buildings on the right.

period demand. As the primary function of the reservoirs on the Credit is to augment the low flow periods, full capacity would be maintained at all times if possible and the spillway capacity would be large enough to discharge the unpredictable surplus if necessary.

3. CONSERVATION STORAGE LOSSES

The holding capacity storage of a reservoir is not all available for discharge as certain losses must be accounted for and deducted, so that the remainder or net storage is what may be used to augment the low flows.

(a) DEAD STORAGE

A reservoir should never be drained bone dry. A certain amount of water is retained to protect the discharge tubes at the foot of the dam, and to facilitate enough silting of the reservoir bottom in the immediate vicinity of the dam to protect natural and artificial seals against damage. Dead storage space, therefore, is not used for flood control, nor is the water available to supplement low flows at the end of a dry period.

The amount of dead storage depends upon the gradient of the bed of the reservoir and its width in the vicinity of the dam, and will vary for each reservoir.

(b) SEEPAGE

In a reservoir there is always some loss due to seepage, but this is not considered as serious and may be disregarded, since it is thought that the additional hidden storage due to raised water tables will compensate for any water lost by seepage.

(c) EVAPORATION

Evaporation loss is a direct function of the water surface area and the rate varies directly with temperature and wind velocities. In this case, precipitation was considered as rain up to the end of November and as snow from then to the first of March.

(d) ICE FORMATION

The amount of ice forming in the reservoirs will also vary directly with temperature and in this case was assumed to be 12 inches in depth during an average year, from December to February, inclusive.

(e) RESERVOIR SPACE FOR HYPOTHETICAL FLOOD

Where flood control is the prime function of a reservoir it is usual to reserve additional space to provide for an hypothetical flood caused by unusual rainfall occurring shortly after the spring run-off when reservoirs are full. Certain precautionary measures are recommended which will render it unnecessary to reserve storage space in the reservoirs to take care of a flood which might occur shortly after the spring run-off period when the reservoirs would be full.

Based on the existing flow records for the Erindale gauge, the average flows for the 112-day and 273-day periods at this point are 58.0 c.f.s. and 175 c.f.s. respectively for the driest year on record and 141 c.f.s. and 189.0 respectively for the average year of the period of records. The Orangeville and Cataract Reservoirs would provide flow increases of approximately 17 c.f.s. and 8 c.f.s. for the respective 112-day and 273-day periods.

CHAPTER 9

METHOD AND ACCURACY OF SURVEYS

1. RESERVOIR SURVEYS

The contour plans of the Cataract, Glen Williams and Norval Reservoirs were drawn by means of stereo-projection from aerial photographs using the Wild projector for Cataract and the multiplex for the other two.

A less expensive method was used in the survey of the other reservoirs.

2. LOCAL IMPROVEMENT SURVEYS

The local improvement surveys at Glen Williams, Churchville and Meadowvale are stadia surveys.

CHAPTER 10

COMMUNITY PONDS

During the summer of 1954 a reconnaissance of all the existing and former ponds on the watershed was made to determine which sites were most suitable for development as community ponds for water supply and/or recreational purposes. In all approximately 115 sites were visited and the present condition of each noted. Of these, 19 sites are considered suitable and are briefly described in the Report.

CHAPTER 11

SUMMARY

The foregoing investigations of the flooding have shown that Glen Williams, Churchville and Meadowvale are the three major trouble areas but that the damage sustained at each does not warrant the construction of costly reservoirs. Therefore, local protection by means of channel improvement has been recommended for these places.

Much of the flooding along the river in the past has been due to the heavy sheet ice which has been allowed to form in mill ponds. This hazard could be greatly reduced by proper dam regulation or by emptying the ponds before the freeze-up and it has been recommended that the Authority take some action in this regard.

The low flow problem, while not as serious as on some watersheds, is causing concern in many local areas and is rapidly becoming more widespread. With low water stages the river becomes increasingly polluted and the potential recreational value of the river is destroyed.

The uses of the river water have been briefly outlined, but the future needs for domestic, industrial and agricultural purposes require a more detailed study which is beyond the scope of this report at the present time. However, six possible reservoir sites with a total storage capacity of approximately 20,940 acre-feet have been outlined. This is the maximum storage available within reasonable economic limits that could be developed and utilized to provide increased summer flows.

While reservoirs are being recommended primarily for the purpose of increasing the natural river flow throughout periods of low water stages, they would also reduce the flood hazard at many points along the river. This is particularly true of the Orangeville project which could readily be regulated to prevent the flooding of No. 9 Highway crossing which occurs almost annually during the spring break-up. The reservoirs would provide many other benefits such as raised ground water tables, recreational facilities and increased power development at those mills using water power.

In addition to the large reservoirs for increasing the low floods and flood control, there are numerous existing ponds and suitable sites where small ponds could be constructed at a reasonable cost to provide water facilities for recreational centres and/or water supplies for nearby urban areas. Nineteen pond sites were selected as a guide to the Authority in laying out a community ponds program.



The mouth of the Credit River at Port Credit where it empties into Lake Ontario.



AN ATTRACTIVE SPRING-FED TROUT
POND IN CALEDON TOWNSHIP.

5

WILDLIFE

CHAPTER 1

INTRODUCTION

Much of the watershed, both land and water, is more spectacular than other areas close to Greater Toronto with its population of more than one million. Hence, the watershed is visited by great numbers of people, including hunters looking for upland game and waterfowl, fishermen seeking fish, and a growing army of naturalists interested in the opportunities to see and enjoy the varied forms of animal life.

The watershed includes a substantial part of the Niagara Escarpment and a part of the interlobate moraine and therefore has much rough land particularly suited to wildlife, and has also in its upper section an abundant flow of springs providing exceptional opportunities for fishing. There is a larger than usual proportion of the land in city-owned clubs, private estates and summer cottages. On much of this land the fish and game are protected from public interference and fostered with more than ordinary care, some to be harvested and others left to fluctuate naturally. The watershed has also much agricultural land of high quality.

The field work on this survey was concentrated on the most immediate problems, particularly on those related to other aspects of conservation. A beginning has only recently been made in the basic research on game environments in Southern Ontario. The techniques of stream and lake surveys are at present farther advanced. In the present survey the chief detailed work was therefore the study of the environment of fish. The extent of pollution of the river, at least from the point of view of fishing, was given special attention. Since there is a rapidly growing interest in natural history in the Credit Watershed and in the populations surrounding it, particular attention was also paid to listing those species of animals that may be met with.

CHAPTER 2

FORMER SPECIES

At least six species of mammals which probably were found in the Credit Watershed at the time of settlement no longer occur in it. These are the marten, fisher, wolverine, timber wolf, Canada lynx and the wapiti, or American elk. The cougar, a more southern species in this part of Canada, may have occurred in the watershed. The bobcat, or bay lynx, may still occur rarely in the northern part of the area.

Among the birds which were permanent residents the wild turkey may have been found in the watershed. There is archaeological evidence that its former range in Ontario extended north and east to Lake Simcoe. Apart from recent introductions it is not now found in Canada.

The passenger pigeon, a migrant, is now extinct. Its vast flocks astounded the early settlers. The Credit Valley lay almost in the centre of the Ontario nesting area. In 1819 passenger pigeons were extremely abundant near Churchville.* There are several records of later nesting colonies in the watershed, e.g., at Esquesing Township, Concession I, Lot 28, and at Georgetown, where there was a very large nesting ground reported in the 1850's. The last large flocks occurred between 1850 and 1870. A few birds bred near Campbellville in 1886, just outside the watershed. The last birds reported in the watershed were a flock of ten seen at Orangeville in 1899.†

*From Survey Diary of J. M. Benson, Toronto Township, in the Ontario Archives.

†The last four records are from: Mitchell, Margaret H. *The Passenger Pigeon in Ontario*. Royal Ontario Museum of Zoology Publication. 1935.

Perhaps the best known of the former wildlife of the watershed was the Atlantic salmon.

In the Canadian Gazetteer, printed 1846, the following reference was made to "the Credit River".

"... This river has long been celebrated for its salmon fishing, immense quantities having been annually taken, in the spring, during their passage up the stream to deposit their spawn. But, from the great number of mills which have been erected on the river during the last four years, the fishing is destroyed, the salmon being unable to make their way over the dams. Immense quantities of lumber are sawn at the mills on the river, and shipped at Port Credit."

This appears to place the last runs about 1841-42.

There were several mills on the Credit before 1835, but most of these used races and by-pass ponds with only low weirs. The mills built in the 1840's had large dams across the main stream in many cases and the presence of these and the silting of the inshore waters of Lake Ontario, the destruction of spawning beds by great quantities of sawdust and bark, and the intensive commercial fishing by nets and spears, are thought to be the chief causes for the disappearance of the salmon from Lake Ontario about 1890.

Amongst the reptiles, the hog-nosed snake almost certainly was formerly found in the Credit Watershed. The last Toronto record was of one taken in 1907.*

The Mississauga rattlesnake is also considered to have been fairly common throughout this part of Southern Ontario and was almost certainly found in the Credit Watershed.

CHAPTER 3

PRESENT SPECIES

There is a rapidly growing interest in natural history in Ontario. In the area of Greater Toronto there is a long record of activity in this direction. Hence the wildlife of the Credit River is better known than that of many parts of the Province. The natural beauty and wild conditions along the cliffs and hills of the escarpment and the beauty of the Credit River are attracting more and more people to the Credit Forks area every year. The shore of Lake Ontario too is of exceptional interest because of the great variety of migrating waterfowl and shore birds. The shoreline is also on the Great Lakes migration route of many species of hawks.

The animals found in the Credit Watershed are a mixture of northern and southern species with ranges which overlap in this area from two of the major life zones of North America, known as the "Canadian" and "Carolinian" zones.†

*From the records of E. B. S. Logier, Royal Ontario Museum of Zoology, Toronto.

†Lee R. Dice. The Biotic Provinces of North America. Ann Arbor, Michigan, 1943.

The Carolinian Zone includes much of south-western Ontario and a small part of the watershed, where a combination of the latitude and the modifying influence of Lake Ontario supports a more southern vegetation. The two different zones can be indicated by a few samples. Amongst the birds the white-throated Sparrow, a northern species, is present in summer in the northern part of the watershed only, and the Orchard Oriole which lives in the Carolinian Zone is found in summer only in the southern part. Amongst the mammals, the Eastern Flying Squirrel may be found in the southern part of the watershed, while the Northern Flying Squirrel and the Bog Lemming occur in the northern area.

The most common mammals in the area are probably the meadow mouse and the mole shrew; the white-footed mouse is also a common species. The report includes a list of 48 mammals which may be found on the watershed.

At least 230 different species of birds either breed in, migrate through, or visit the watershed, apart from those now extinct. They are detailed in the report.

The watershed contains at least 24 species of amphibians and reptiles. Many people have an unreasoning fear of frogs, toads and salamanders, although they are harmless, and useful to the gardener and farmer. Of the salamanders the mudpuppy is revolting in appearance to most people, but remains near the bottom of rivers and is not frequently seen. The adults of the other salamanders are occasionally encountered under logs and detritus in forested land.

All of the species of snakes appear to be generally distributed in the parts of the watershed not yet built up. The Eastern garter snake is probably the commonest. The northern water snake is found only around ponds or near streams. One species of turtle, the wood turtle, is included because it has been recorded from Thistleton on the Humber River and at Bronte Creek in Halton County, and so should in all probability be found in the Credit Watershed.

The watershed is not within the known range of any venomous snake. It is very unlikely that any rattlesnake remains in the area. It should be added that neither copperheads nor water moccasins occur in Ontario at all, and the common water snake, which is hostile to man when wild, when captured rapidly becomes docile.

CHAPTER 4

IMPROVING THE LAND FOR WILDLIFE

The elimination of grazing of woodlots would be the most useful single measure in improving the wildlife environment. In plantations, up to about the tenth year from planting, the entire planted area is valuable for wildlife. But large blocks of coniferous trees will, at least after the twelfth year from planting, have little or no undergrowth and will, apart from their edges, be comparatively sterile as far as upland game and most forms of wildlife are concerned. The chief improvements to be expected will therefore come from

good management of the farm woodlot. Selective cutting is both sound forestry practice and good planning for wildlife. Landowners who have woodlots in which the crown canopy has closed over considerable areas, and who wish to produce a proper environment for wildlife, will find that release cuttings, slashings to stimulate sprout growth, thinnings and felling timber for sale will improve rather than retard the carrying capacity for wildlife. Construction of brush piles from cuttings is recommended where rabbits are desired, two or three such brush piles per acre being the normal spacing.

All good farming practices which make a more luxuriant vegetation will improve the farm environment for wildlife. Strip-cropping is of particular value since by this means no extensive area is denuded of cover at one time by harvesting. In the less flat parts of the watershed, filter strips, either above water-diversion terraces or used as emergency waterways, provide travel lanes and nesting cover for wildlife. Cover crops such as the clovers provide a habitat and food for wildlife in areas that would otherwise be barren during the winter months.

The elimination of brushy fencerows is now becoming more common in the Credit Watershed. Those who are interested in wildlife improvement will find that the inclusion of a few field boundary hedges on the farm will moderate the effect of winds on crops, serve as travel lanes and cover for wildlife, and harbour large numbers of songbirds which help to control insect pests. Inevitably, the presence of boundary hedges on a farm tends to encourage the growth of weeds. This is the price that must be paid for improved wildlife conditions. *Rosa multiflora* is an excellent hedge-forming shrub. It has a tendency in Southern Ontario to die back in winter, but rapidly forms a dense hedge, which is reported to be proof against cattle and hogs.

Field corners are frequently barren of crops. Therefore, a fence crossing which embraces the corners of four fields may be made into a haven for ground-nesting species by planting a few trees and shrubs and protecting them. It is important to rid such areas of useless weeds by crowding them out with useful species such as white sweet clover or the normal climax type of open vegetation, which is bluegrass.

The importance of water to wildlife is often forgotten. Many farms have at least one low spot where a small amount of work with a scoop will create a dam and a pond to provide nesting and feeding sites for water and marsh birds. If possible, ponds for wildlife should be separate from those intended for cattle or for fish. Willow cuttings pushed in the ground around such a hollow will rapidly provide wildlife cover.

CHAPTER 5

FISH

1. INTRODUCTION

The purpose of this survey was to classify the waters of the Credit drainage basin as to their present suitability for fish, and to make recommendations for possible improvements, with examples in detail.

2. METHODS

The Credit River and its tributaries were visited at 266 stations which were from half a mile to three miles apart on each stream course. The topographic features of the valley and the erosion, vegetation, volume of flow, turbidity, temperature and type of bottom were listed for each station. At all suitable stations collections of the aquatic insects and other invertebrates were made. At most of the stations collections of fish were also made which were later examined and classified, and were used in zoning the various sections of the river.

The aquatic insects such as mayflies, stoneflies and caddisflies were most useful for this purpose, since many of them are reliable indicators of the stream conditions at the critical time of year. Some species are confined to waters which remain cold and usually clear in summer, such as trout waters. Other species are indicators of permanent flow or of polluted water or of the maximum summer temperature of the water. Thus the potentialities of a stream for particular species of fish are indicated. Fish collections and records of maximum-minimum thermometers substantiated these findings at their particular stations.

Since the procedure here used follows that of previous river surveys, it allows close comparisons of the characteristics of many rivers.

Thermometers were installed and kept in place during the latter part of July, all of August, and part of September. Two of the thermometers were used for shorter periods at other stations. Readings from the maximum-minimum thermometers were taken at intervals of two days, or in a few cases three days.

3. THE RIVER VALLEY

Almost all of the streams in this watershed that have permanent flow are fed from the land above the escarpment. The main branch of the Credit River rises amongst the sandy and gravelly hills, terraces and swamps, close to Orangeville. The first tributary of importance drains the land surrounding Caledon Lake, and joins the main branch below Alton. The west branch of the Credit rises in swamps near Hillsburgh and drains much of Erin Township. The two branches cross a wide and swampy spillway and drop from the escarpment edge in spectacular falls and rapids at Cataract and Belfountain, joining at the Forks of the Credit.

Below the Forks the river drains an alluvial plain and is increased by a tributary (South Caledon Creek) from the east, which crosses Highway No. 10 westwards near the base of the Caledon mountain. Below this tributary the Credit River flows close to the escarpment edge for some 15 miles, and there are many short steep watercourses descending the escarpment.

The next important tributary drains the land surrounding Acton, passes through Stewartown, gains in volume of flow from Silver Creek at Georgetown, and enters the Credit at Norval. Below this point the tributaries are unimportant except as contributing to flood conditions and silting. The main



Poor fish cover, eroded banks and lack of shade, along the main Credit below Credit Forks. One advantage of this section of stream is that dry-fly casting is easy on this stretch of river.

This tributary of the Credit has alders on the banks, several deep holes and good fish cover both from logs and bank vegetation. This is an excellent trout stream in Erin Township.



river now flows through a wide valley cut more than 60 feet in the boulder clay, until it is deflected north-eastward by a barrier beach of a former lake at Erindale. It finally passes through this and becomes much ponded and weedy, reaching its mouth at Port Credit, where there is another sand bar.

Twenty major obstructions to the movement of fish are shown on the map accompanying the report. These include 18 dams and also the High Falls at Cataract and the dam and waterfall at Belfountain. Some of the dams on the smallest streams are not included in this total.

The general condition of the stream bottom and the bottomlands in at least the lower sections of the Credit Valley was radically affected by the hurricane of October, 1954. However, the effect of the hurricane *above* Terra Cotta was relatively mild and at Credit Forks the river did not rise as high as it had already risen in the spring of the same year.

4. PERMANENCE OF FLOW

Permanence of flow of the river and its tributaries is shown on the map "Biological Conditions of Streams" which appears in the main report. A few comments may be added to the information on the map. Below Credit Forks very few of the streams running off the escarpment have a permanent flow. It appears probable that the surface of the bedrock dips westward from the escarpment edge.

The Credit exhibits two unusual features. One is the great reduction in the flow of the main stream during dry summers from Credit Forks down at least to Erindale. For example, the minimum daily flow at Cataract in 1946 was 11 cubic feet per second, and this was reduced to a minimum daily flow of 3 c.f.s. at Erindale in September in spite of the addition of many tributaries. In more normal years the flow at Erindale does not fall below about 30 c.f.s. In 1954 the minimum daily flow at Erindale was 61 c.f.s.

The other unusual feature is the remarkable evenness of flow in the trout-producing water in the upper regions of the river. Thus, in the nine years ending 1954, the minimum daily flow at Cataract neither fell below 11 c.f.s. nor rose above 18 c.f.s.

From the flows estimated during the 1954 survey it seems that there is very little underwater seepage into the main stream, at least below Credit Forks.

Although the month of July, during the survey, was exceptionally dry so far as precipitation was concerned, the effect on the river's flow was negligible. The conditions for fish were not extreme during the course of the survey so far as flow was concerned. This fact should make the 1954 classification of particular value since extreme conditions of flow do not usually occur more than once in ten or more years.

The reduction in flow in dry summers may be attributed either to evaporation, particularly evaporation from the ponds backed up behind the dams, or to the removal of water for irrigation. This practice is rapidly increasing in

Southern Ontario, and may soon have a radical effect on the capacity of the Credit River to produce fish. It will of course reduce the capacity of the river to dilute the wastes from sewage and industrial plants.

5. TEMPERATURE CONDITIONS

The summer temperature conditions affecting the distribution of fish are shown on the map accompanying the report. Adult speckled trout should thrive best in the lower parts of the sections coloured blue. The greatest daily fluctuations in temperature are found in the sections coloured green. Speckled trout may inhabit some of the green sections, particularly the upper parts, in early or late summer but will move out or be killed in the warm days of midsummer. Brown trout appear to adapt themselves better to the higher temperatures in these sections, and several were caught by angling between Norval and Inglewood, although there have been several kills of brown trout, presumably from high temperatures, at Norval.

The maximum and minimum water temperatures noted at the continuous recording thermometer at Terra Cotta in 1954 were 81° and 58° Fahrenheit. At Terra Cotta the water temperature rose from 59° to 79° in a single five-day period, but there was adequate time for acclimation of the fish to the high temperature.

When a river which has many cool springs, such as the Credit, reaches a low flow, almost all of its flow is coming from cool springs, and the temperature may therefore be lower than when the flow includes a higher proportion of run-off. In 1954 the flow of the Credit did not come close to the lowest flows which have occurred.

From records it can certainly be concluded that in the stretch of river from Terra Cotta to Norval the margin of safety, even for brown trout, is very small and that high summer temperatures will frequently be a critical factor in their survival. Their growth rates are also radically reduced when the water temperature rises much above 70°.

6. FISH DISTRIBUTION

Thirty-six species of fish were found in the rivers and streams of the watershed during the survey of 1954.

The distribution of the major game fish species and some others, based on the 1954 collections, is shown on the map accompanying the report which, of course, is not intended to provide an estimate of the relative numbers or of the locations where fish *of legal size* will be found.

Of the 161 stations where there was evidence of permanent flow, speckled trout were found at 45 stations. They were common in the permanent, unpolluted tributaries from Georgetown north, but south of Georgetown were found in only one small stream near Streetsville. They were not found during the survey anywhere in the main stream below Credit Forks, although they should thrive in the river for at least two miles below this point, so far as summer



A tributary of the Credit close to its spring source. This photograph, taken in zero weather, shows the effect of the relatively warm spring source, keeping the stream unfrozen.

This is the typical appearance of the Erin tributary where it runs in a shallow and wide course cutting through a former glacial spillway. The stream would be much improved for fish if it were narrowed and deepened here at intervals.



temperature is concerned. The presence of predatory brown trout in this section, and the very heavy fishing pressure, might account in part for the fact that no speckled trout were found there during the survey. In this connection the distribution of sculpins (muddlers) is interesting. These are small fish which are commonly restricted to streams suitable for speckled trout. Of the nine stations at which sculpins were found, three lie on the main Credit below Credit Forks.

Pike were reported as common in Acton Pond, which was not examined during the survey. They were not observed in any of the streams during 1954, but probably occur in the warmer and more silted sections. As they are exceptionally active and alert, they are not very commonly collected in small minnow seines.

The largemouth bass which were noted at Acton are presumed to have been introduced there. Smallmouth bass were found only in the lower sections of the main stream. The brown bullhead or catfish is a common species in the main stream, from near Huttonsville to the mouth.

7. POLLUTION

Pollution of the Credit River is discussed in detail in the Water section of the report. As far as pollution concerns fish the heavily polluted areas are sections of tributaries below Orangeville, Acton and Georgetown, and on Black Creek from Alton almost down to its junction with the main Credit at Norval. All of these sections were once excellent trout streams and all are now spoiled for game fish.

The effluent of the Streetsville sewage treatment plant did not affect the river noticeably during the survey of 1954, so far as fish are concerned. Healthy small-mouth bass were present in the river just below Streetsville, as well as six other species of fish. The bottom fauna at this point appeared to be typical of relatively unpolluted streams. However, the growth of population and industries of Streetsville will increase the pollution problems below the town, particularly in winter, when the sludge freezes in the flotation beds. Apart from the public health aspects of the problem, the best indication of pollution is probably the presence or absence of certain sensitive plant and animal species, since these show what has happened to the stream over a long period of time while physical or chemical tests show only the condition of the water at the time of testing.

The silting of the Credit and its tributaries from the operations of two gravel pits results in a great reduction in the production of bottom fauna below them, and probably affects the suitability of the river for fish.

It is recommended that the Conservation Authority:

- (a) Set up an Advisory Committee on Pollution;
- (b) Urge the enactment of legislation defining the terms of reference of the Pollution Control Board of Ontario and giving it adequate powers to enforce its decisions;

- (c) Urge the installation of a permit system for every new outlet, large or small, which leads into a watercourse;
- (d) Urge the setting up of a time limit within which all municipalities, industries and home owners who now pollute a stream or streams must adequately treat their industrial or other wastes;
- (e) Carry out an extensive educational program concerning pollution.

8. STREAM IMPROVEMENTS

There are local reports that fishing success has declined in at least the Credit Forks area since thirty or forty years ago. The sizes of the larger speckled trout taken and the number of fish of legal size appear to be reduced. There is no statistical evidence of this because the fishing effort and the resultant catch have not been measured. The reports may also be untrue, because there are probably many more people fishing than formerly. Little is known concerning the present trend in the trout population, i.e., concerning the growth rate and survival of naturally spawned and introduced fish. Changes in the character of the river bed, in the effects of competition and predatory brown trout, and in the water temperatures, may have been the critical factors in different years, but fishing pressure may have had the greatest effect.

9. OWNERSHIP

Of the 266 stations examined on the Credit, 21 were found to be posted against fishing, but many road crossing were not stations, and there were probably 60 or more crossings at which the waters were posted. This number is certainly rapidly increasing. Good trout water open to the public and within easy access of the large centres of population is rapidly becoming a rarity. Some governments, for example that of New York State, have already acquired stretches of first-class trout rivers so that they will not be lost to the general public. The Credit River, besides its fishing, has a great deal of spectacular scenery and its gorge also contains a very interesting flora. The Conservation Authority might therefore consider the possibility of urging the acquisition of at least one or more good stretches of the river and valley for the public.

10. FARM FISH PONDS

There is ample room for improvement of this type of fishing. The chief research on management of farm fish ponds has been carried on in southern and warmer climates, and therefore the findings cannot be applied without qualification to an area having the climate of Southern Ontario, but some definite recommendations may be made. Suitable methods for the construction of six types of farm pond are given in a bulletin, "Farm Ponds", which may be obtained from the Ontario Department of Agriculture.

From the fisherman's point of view, farm ponds are of two main kinds:*

*An excellent handbook on the details of construction and management of farm fish ponds is "Fish Ponds for the Farm", by F. C. Edminster, published by Charles Scribner's Sons, New York, 1947.



Field stone placed along the bank of the main Credit to prevent erosion, one and a half miles north of Inglewood.



An upstream small dam. Bank-cribbing to prevent erosion can be seen in the background, and there is fair fish cover.

(a) TROUT PONDS

The first is the cool pond with continuous inflowing water and maximum temperatures at the surface of about 75° Fahrenheit with cooler bottom. Ponds of this type are adapted to the production of speckled or brown trout. They are usually placed near the headwaters and may range in size from about an acre to 8 or 10 acres. Depth should be 10 feet or more in the deepest part. Spring flow of as low as half-a-cubic foot per second will maintain a pond of one acre.

(b) WARM-WATER PONDS

The second and commoner type of farm pond is the warm-water pond. Most farms have at least one low spot suitable for a fish pond. It is frequently good practice to have separate ponds devoted to wildlife and fish and to control the aquatic plants in the fish pond.

In managing warm-water ponds for fish the following points should be kept in mind.

(1) A minimum depth of 15 feet over at least 25 per cent of the pond should be planned to avoid excessive winter kill, probably the critical factor in fish survival in farm ponds in Ontario.

(2) If suckers, carp or large numbers of minnows are already present in the pond, it is usually best to destroy all fish in the pond before stocking.

(3) It is often necessary to control existing aquatic vegetation. There are both mechanical and chemical methods available.*

(4) There have been few tests made in Ontario of the efficiency of applications of fertilizer in increasing the crop of plankton, the smaller aquatic invertebrates. The research now being carried out in this field may lead to application of fertilizers such as 8-8-4 becoming more general.

(5) Since many of the species commonly recommended for introduction grow very slowly in Ontario waters, research to determine the most satisfactory species will be needed. New ponds and those in which the previous fish have been destroyed might be stocked experimentally with a combination of large-mouth bass (*Huro salmoides*) and bluegills (*Lepomis machrochirus*) at the rate of 100 bass and 1,000 bluegills per acre. Fishing should be deferred until some of each species have spawned successfully.

The chances of success with these species would be greatest if the pond were situated within 5 to 10 miles of Lake Ontario, in the part of the watershed with a relatively mild climate.

*Speirs, J. Murray. Summary of Literature on Aquatic Weed Control. Canadian Fish Culturist, 3: (4); August, 1948.



AN IDEAL PICNIC SPOT
BELOW "THE FORKS".

6

RECREATION

CHAPTER 1

RECREATION PLANNING

There is an urgent and ever-increasing need for public recreation facilities on the Credit Watershed.

The location of the watershed with respect to the major concentrations of urban population in south-central Ontario is a feature of the greatest importance. The valley lies close to Metropolitan Toronto and Hamilton, the two largest centres of a belt of rapidly expanding and coalescing urban nuclei stretching from Oshawa to the Niagara Peninsula. Moreover, the upper reaches of the

Credit are readily accessible to the heavily populated industrial centres in the central part of the Grand River.

Approximately 38 per cent of the total population of Ontario resides within a 45-mile radius of the Forks of the Credit in the central section of the valley. While the province as a whole is currently showing an increase of about 3 per cent each year, much of the heavily populated urban area on the periphery of the watershed is growing at a rate of 5 per cent per annum. If present trends continue it is possible that in the next 25 years there will be 2,400,000 people living within the area encompassed by the aforementioned radius from the heart of the river basin. About 80 per cent of this total will probably be situated in Toronto, Hamilton and the interconnecting lakefront plains. The plight of the larger urban centres, which are already in dire need of conveniently located regional parks beyond the confines of built-up areas, will be proportionately intensified unless positive action is taken to remedy conditions. Many of the villages and towns of the valley are now undergoing rapid expansion on their margins. They will soon find themselves surrounded by a solid wall of securely fenced private property, which prevents the population in the interior of the municipality from reaching the riverfront and shuts out the suburban residents who own homes behind the initial waterfront subdivision. The loss of these resources will be unjust and in some cases the situation is already reaching serious proportions.

The proposed greenbelt of Metropolitan Toronto aims at the development of the lower sections of the Don and Humber Rivers. The Credit River cuts across the plain in a deeply entrenched valley of imposing proportions and immense recreational potential. When compared with the Don and Humber there has been little development along its lower course except near the village of Port Credit. This section of the valley should be preserved as a greenbelt area for the urban development which will undoubtedly take place on either side. Moreover, the flat valley floors are highly susceptible to periodic floods and hence entirely unsuitable for permanent buildings. When the Faulkner Marsh is completely filled and converted to parkland, Port Credit will possess a riverfront recreation area running from the Lakeshore Road to the C.N.R. tracks. The remainder of the valley in Toronto Township northward from the C.N.R. to the Dundas Highway should be devoted to greenbelt uses. No future subdivisions involving riverfront areas should be permitted unless the valley lands are secured for public use. A positive program of parkland acquisition should be steadily carried forward in this area.

To the north, the more desirable sections of the valley should be developed as Conservation Areas, a large part of which would be devoted to recreation purposes. Eventually, these should be linked by a riverbank nature trail and public footpath.

Another group of recreation resources is found on a belt of tumbled hills (the interlobate moraine) lying to the north of the plains. A large part of the area abounds in springs and kettle lakes which often form the sources of the streams running southward across the level agricultural plains to Lake Ontario. Much of this area contains steeply sloping, droughty, erodable, sandy soils of

low agricultural capacity. In certain sections large patches of excessively bouldery soil are frequently encountered. Much of this hilly land should be devoted to reforestation and recreation uses. This physiographic feature, together with a part of the Niagara Escarpment, constitutes the essential core of the proposed "Outer Greenbelt" of Metropolitan Toronto.

CHAPTER 2

THE CREDIT FORKS MULTIPLE-USE CONSERVATION AREA

This chapter advocates the establishment of a multiple-use Conservation Area at the Forks of the Credit River.

The convenient location, topographic configuration, aquatic resources and suitable forest cover have combined to make this scenic landscape one of the potential parklands adjacent to the densely populated parts of South Central Ontario.

1. CENTRAL REGIONAL LOCATION

The approximate road distances from selected urban centres surrounding the heart of this development are presented in the following table.

DISTANCES TO THE PARK FROM SELECTED URBAN CENTRES

Urban Centre	Population	Distance
Brampton.....	11,165	17.5
Guelph.....	30,950	26.0
Hamilton.....	222,902	56.0
Kitchener-Waterloo.....	69,695	42.0
Orangeville.....	3,564	12.0
Port Credit.....	5,129	30.5
Metropolitan Toronto.....	1,250,773	50.0

2. TOPOGRAPHY AND GEOLOGY

The area within this proposed development may be separated into three distinct topographic divisions, namely, the face of the Niagara Escarpment which could be considered to form the spinal cord of the park, the bouldery and hummocky lands in the north and west, and finally the rolling to level plains stretching south and east from the base of the escarpment to Highway Number 10.

3. WOODLAND COVER

Approximately 64 per cent of the area is woodland and the particular characteristics of this sylvan pattern greatly improve the quality of the site. The tree cover encloses open valley flats and hillsides of sufficient size and strategic location to create a true impression of variety and spaciousness. Developments in the various pockets of open land would be adequately screened on all sides by broad belts of trees and thus the parklike environment would be thoroughly maintained.

4. AQUATIC RESOURCES

The area contains lakes and ponds varying from one to ten acres in extent in addition to several miles of beautiful river frontage along the Credit River and its west branch. There are several miles of small tributary streams through various sections and the face of the escarpment abounds in springs. The rough hills at the base of the northern wing of the valley possess a considerable artesian water supply as evidenced by the borings on nearby properties.

5. WILDLIFE

Due to the dense woodland cover, the abundance of clear cool water and the relative inaccessibility of certain sections, the area contains a considerable variety of wild fauna.

Deer are plentiful and there is a goodly representation of all the typical small mammals of the region. The bird life is sufficiently varied and plentiful to satisfy the demand of the ornithologists. In the summer of 1953 two Golden Eagles, a rare bird in this region, were observed at the Credit Forks. The species probably nests along the sheer cliffs of the escarpment.

6. PRESENT LAND USE

There are four distinct existing and potentially expansible forms of private land use within the area, namely, agriculture, gravel extraction and quarrying, permanent residential homes and recreation of several types. Each of these forms of land use presents certain problems in the acquisition of the area as a public parkland or in the preservation of the superb natural recreation potential of the locality.

7. THE URGENCY OF THE SCHEMES

There is need for immediate and positive action if this land is to be set aside for the people of Ontario. Some of the current and potential forms of land use could utterly destroy the natural beauty of the landscape and its superb recreation potential.

8. NATURE OF PROPOSED DEVELOPMENTS

A Conservation Area of this size, diversity of landscape types and proximity to dense centres of population can be developed so as to satisfy a wide variety of recreation activities at all seasons of the year.

CHAPTER 3

OTHER PROPOSED MULTIPLE-USE CONSERVATION AREAS

The full utilization of the recreation potential of the watershed necessitates the development of a chain of small conservation areas along various sections of the river and its major tributaries. Ideally this chain should be linked by public footpaths and hiking trails along the riverbank areas.

*The Credit River
in the Meadow-
vale-Churchville
Conservation
Area presents
anguid stretches
of water which
mirror the trees
on the banks.*



*The well wooded banks of the Credit
River frame a picturesque section of the
Terra Cotta Conservation Area.*

*The open pasturelands along
the banks of the Credit in the
Meadowvale-Churchville Con-
servation Area are a popular
picnic area.*





The old ruins of the lime kilns in the northern section of the Limehouse Conservation Area should be preserved since they are a monument to a former period in the history of pioneer development.



Silver Creek flows through the heart of a beautifully wooded valley south of Limehouse. When the polluted condition of the waters of the stream is overcome this Conservation Area will offer superb recreation resources.

The warm, clear waters of the large pond in the North Caledon Conservation Area provide excellent swimming.



The urban municipalities within the valley should secure and commence to develop immediately the river banks and flood plains within their boundaries as municipal parklands and public footpaths. The Credit Valley Conservation Authority should concentrate its attention on similar developments in the open countryside.

There are many sites within the valley which are very suitable for development by the Authority as small parks. To provide an example of the type of development envisaged and to bring attention to specific schemes to be immediately undertaken, four projects in various parts of the valley are fully described.

It must be remembered that land is relatively expensive in most sections of the Credit Valley due to the close proximity of the watershed to the rapidly expanding peripheral urban areas. Wherever possible, it is desirable for the Authority to aim at a multiple land use program which combines water conservation and reforestation schemes with recreation. This ensures the maximum returns from the investment in land purchase and permits the Authority to compete effectively in the real estate market where potential intensified multiple land use is an important factor in price determination.

1. THE MEADOWVALE-CHURCHVILLE CONSERVATION AREA

The 377 acres of river flats and valley slopes lying between Meadowvale and Churchville have been selected for development by the Authority as a multiple-use Conservation Area in the southern section of the watershed.

The river bottom lands included in this scheme are very susceptible to flooding. Almost every spring all or certain sections of the area are covered with water to a depth of several feet. Hence the land is entirely unsuitable for permanent buildings of any type. In the spring of 1955 a number of houses on low-lying land at Churchville, together with Martin's Park, were purchased by the Provincial Government due to flood hazard. The land acquired has been included in the area covered by the scheme.

Certain sections of this Conservation Area, especially at the northern end, could be reforested. At the south-east corner of the property on the outskirts of Meadowvale a by-pass pond could be constructed cheaply on the site of the old mill pond. The remainder of the area should be devoted to parkland uses.

2. THE LIMEHOUSE CONSERVATION AREA

Approximately 315 acres of land immediately south and east of Limehouse are recommended for treatment by the Authority as a multiple-use Conservation Area.

Approximately 115 acres or 36 per cent of the Conservation Area is tree-covered and 73 acres or 23 per cent is now used for pasture. About half of this consists of unimproved grassland on bouldery or excessively shallow soils. Little arable land will be removed from production by the scheme.

There is one two-storey solid brick house and a small frame barn situated on the property just to the east of the old mill ruin. The remains of the old lime kilns are located close by.

This Conservation Area lies about 2.5 miles west of Highway No. 7 and approximately midway between Georgetown and Acton. The Canadian National Railway skirts the northern edge of the development and there is a small station at Limehouse.

3. TERRA COTTA CONSERVATION AREA

Situated along the banks of the Credit River about a mile north of Terra Cotta, the 185 acres included within this Conservation Area are recommended for treatment under a reforestation and recreation scheme.

The open section consists mainly of steep-sided or poorly drained lowland pastures and idle land. About 8 acres south of the road in the south-west corner are occasionally cultivated as hay pastures.

4. NORTH CALEDON CONSERVATION AREA

Approximately 550 acres of land on Lots 24 to 27 of Concession IIIW in Caledon Township are recommended for development as a multiple-use Conservation Area.

For the most part this area is composed of a rough and bouldery tract of excessively sandy soils frequently interspersed with poorly-drained kettles and a sinuous network of small spring-fed streams originating on the property.

As this is a source area for a short tributary stream entering the main Credit River at Alton, the waters are cool and unpolluted. In addition to the streams there is a 10-acre pond in excellent condition on the east half of Lot 26 and another shallow natural pond about 300 feet in length immediately to the north-east of the former.

About 290 acres or slightly less than 53 per cent is forest-covered and approximately 40 acres of rolling terrain adjacent to Highway No. 24 is now cultivated. The remaining open land is in pasture, the majority of which is unimproved grassland associated with rough, steep hillsides.

The only buildings in the area are located on the west half of Lot 26 where there is an abandoned barn and house in poor condition.

This development would form the northern terminal point of the Scenic Route and Conservation Trail discussed in Chapter 7. Situated only a short distance from both Orangeville and Alton, it would serve as an organization centre for outdoor community recreation activities in the northern end of the valley.

The well wooded cliffs of the escarpment at the Forks of the Credit are an imposing feature of this parkland.



Below the falls at Cataract the waters of the Credit River speed turbulently downstream through an unevenly graded, boulder-strewn bed entrenched in a well wooded, steep-sided valley of great natural beauty.





CHAPTER 4

COMMERCIAL PARKS

The small commercial park occupies a significant position in the current recreation patterns of the Credit Valley. Several of the developments, including Stanley, Belfountain and Eldorado Parks, were established prior to 1914 and their locations are closely connected with the railway network. In the inter-war period there was a steady but unspectacular increase in commercial parks. Since 1950 there has been a marked upsurge in these developments and during this period about 50 per cent of the park area has been established. These later developments are dependent upon the motorist and hence bear no direct relationship to railway lines.

It is estimated that the combined attendance at the 12 commercial parks of the Credit Valley during the summer of 1954 was approximately 180,000 people. On a major holiday or an exceptionally fine Sunday, over 15,000 people utilize these facilities. About 60,000 people visit Stanley Park in a summer season. Several other parks have a seasonal attendance ranging from 20,000 to 25,000 people.

The vast majority of the patrons come from the Toronto area. However, the people of Hamilton and district form a significant proportion of the total attendance at the parks above the escarpment and in actual fact form the majority of those patronizing "The Breezes" at Acton. The local residents of the watershed frequently visit the parks in their immediate vicinity and Brampton people form a noticeable segment of the total patronage of Ferndale, Terra Cotta, Huttonsville, Eldorado and Martin's Parks. Only one of these developments, namely Willow Park, is utilized by passing American tourists and their numbers are insignificant in the overall picture.

The presence of the concentrated mass of urban population in Metropolitan Toronto and Hamilton and along the intervening lake front to the south is of prime importance since recreation space in these areas is at a premium. Moreover, the "park in the countryside" cannot be duplicated within these urban centres.

The ever-increasing number of automobiles and the continued improvement of the roads of the area have brought the Credit Valley within easy reach of the urban dwellers at a minimum expenditure of time and money.

The natural beauty of the Credit Valley itself has been a strong attractive force. The broad and shaded flats of the lower reaches of the river together with their aquatic resources are ideally suited to recreation activities. The natural beauty of the escarpment in the central part of the watershed has few if any rivals within such a short distance of Metropolitan Toronto. The wooded cliffs, vistas, waterfalls and fast-running streams of this section annually attract thousands of motorists and thus provide a steady flow of traffic for the commercial parks of the area to draw upon.

1. MINDZENTY PARK

This 15-acre recreation development, which was established in 1953, is conveniently located in the broad valley flats on the west bank of the Credit River about two and a half miles north of Highway No. 5 and one and a half miles south of Streetsville. The park is owned and operated by the St. Elizabeth's Hungarian Catholic Church, Toronto, but it is open to everyone. On an average weekend Hungarians form a minority of those in attendance.

The admission charge is 50 cents per car, regardless of the number of occupants. Up to 2,000 people have visited this park in a single day and the total seasonal attendance is approximately 10,000 people.

2. CREDIT VALLEY PARK

Situated on 10.5 acres of river bottom land on the east bank of the river, Credit Valley Park is located about one mile south of Streetsville.

The admission charge at this park is 25 cents per car. An attendance of 200 to 300 people is not uncommon on a holiday and the total seasonal attendance is approximately 4,000.

3. MARTIN'S PARK

Opened about 1937, the small 3-acre park lies on the east bank of the Credit at Churchville. In spite of its limited size, this park is a popular recreation point. The admission charge is 25 cents per car. Total seasonal attendance is approximately 1,000 cars.

4. ELDORADO PARK

Located on the main Credit River midway between Huttonsville and Churchville, this is one of the oldest parks on the watershed, having been developed before the first war. It was originally served by a railway line and for many years was operated by the railway interests as a park and amusement centre. In 1936 the property was purchased by the United Jewish People's Order Mutual Benefit Society and Camp Naivelt was developed on the site. However, approximately 25 acres of the property are open to the public as parkland.

The admission charge is 50 cents per car and this includes the use of the swimming pool. The annual attendance at this park for picnic purposes is approximately 7,500. There have been up to 10,000 people in attendance on particular conventions. A holiday crowd of 500 is not uncommon.

5. HUTTONSVILLE PARK

First opened in 1925, this commercial park, which is situated on the Credit River about a quarter of a mile above Huttonsville, occupies about 13 acres. The admission charge is 50 cents per car. On a fine holiday about 600 cars enter the park. The total seasonal attendance would be in the vicinity of 20,000 people.

The pond created by the dam across the lip of the falls on the west branch of the Credit River greatly enhances the scenic qualities of Belfountain Park and provides excellent swimming.



The swimming in the pond above and the stream below this dam is a popular feature of Huttonsville Park. The dam is now in need of considerable repair.

Credit Valley Park situated on ten acres of river bottomland about a mile south of Streetsville is a popular weekend picnic area.





The wooded banks of the Credit River about a mile below the Forks frame the vista over the shadowed waters.



At Cataract, where the remains of the hydro plant are still standing, the sparkling waters of the main branch of the Credit River tumble down overhanging limestone into the beds of soft red shales in the valley below.

In Belfountain Park the west branch of the Credit River spills over boulder dam and limestone ledges in a flimsy curtain of foam.



6. WILLOW PARK

This 10-acre commercial park, which lies on the west bank of the Credit at Norval, was opened in 1950.

The admission charge is 50 cents per car. On a good Sunday the park will be visited by about 100 cars. The total seasonal attendance is approximately 3,000 people. As this park is situated beside Highway No. 7, it is occasionally patronized by passing American tourists who stop for meals.

7. THE BREEZES

Located immediately west of Acton and about a mile south of Highway No. 7, this 25-acre development was begun in 1953.

Perhaps 1,500 people attended this centre in 1953. When the park is fully developed it will be able to accommodate large picnics and the seasonal attendance should then climb very rapidly. The minimum admission charge is 25 cents per car and the maximum for a full carload is 50 cents. It is worthy of note that the majority of the patrons of this park are Hamilton residents with only a sprinkling of Toronto people attending.

8. TERRA COTTA PLAYGROUND

Embracing about 100 acres of land on the red clay slopes of the escarpment, Terra Cotta Playground is situated about one and a half miles north of the main Credit River at Terra Cotta.

Admission charges are 50 cents per car or 10 cents per person. Total seasonal attendance is estimated at 20,000. Several large industrial picnics utilize the facilities of this park each year.

9. FERNDALE PARK

Located on the banks of the Credit at Boston Mills, Ferndale Park was first opened about 1921.

There is no charge for admission to this park. The annual seasonal attendance is about 15,000. There is a total summer resident population of about 500 in the rented cabins and in a group of privately owned cottages to the south and west of the park. Most of the patrons of this park come from the Toronto area, although a considerable number of Brampton people are regular visitors. Hamilton residents used to come to the park by train, but this business has now disappeared.

10. BELFOUNTAIN PARK

Established shortly after the turn of the century, Belfountain Park lies amidst surroundings of great natural beauty. Here the west branch of the Credit drops off the escarpment in a picturesque waterfall which has been further heightened by the construction of a stone dam.

The admission charge is 50 cents per car and 10 cents per person arriving on foot. The total seasonal attendance is about 25,000 and on a busy holiday about 1,500 people use the park. Many visit the area simply to view the spectacular falls.

11. STANLEY PARK

Situated in the northern part of the village of Erin and first opened in the 1890's, Stanley Park is one of the oldest and most popular developments on the Credit Watershed.

There is no admission charge. Organized picnics are charged 15 cents per head for services rendered. This is the most heavily utilized park on the watershed, with an annual attendance of at least 60,000 picnickers.

CHAPTER 5

PERMANENT SUMMER CAMPS

At the present time there are four permanent camps on the watershed and they occupy an area of about 365 acres. The total seasonal attendance is approximately 1,100 and over 90 per cent of the campers come from Toronto and district.

The close proximity of these centres to the urban concentration of population has been an important factor in their development. Supplies have always been easy to procure at reasonable cost and travelling expenses are at a minimum in both time and money. The watershed possesses sufficient scenic attraction and a healthy outdoor environment to be suitable for this type of development. However, it should be noted that the aquatic resources of the river have proved insufficient in three of the camps where artificial swimming pools have had to be constructed. At the Ukrainian Youth Camp it has been necessary to dam and bulldoze the creek to build a pond for swimming.

1. CAMP NAIVELT

This camp, situated on the main Credit River about two miles of Churchville, has been developed by the United Jewish People's Order Mutual Benefit Society on 115 acres of land purchased from the Canadian Pacific Railway in 1936.

The total seasonal attendance is approximately 450 and a staff of 10 supervises camp activities. The average stay of the campers is two weeks but 15 to 20 per cent remain for the entire summer. Approximately 95 per cent of the children come from the Toronto area.

2. CAMP NORVAL—WEST END Y.M.C.A.

Located on 80 acres of land on the main Credit River about half a mile west of Norval on Highway No. 7, Camp Norval is the oldest operating unit on the watershed, having been first opened in 1926.



Some of the permanent camps have constructed dams across the smaller tributaries, to provide ponds for swimming, like this one at Camp Weselka.



A large number of picnic tables have been laid out along the banks of the Credit River in the Streetsville Recreation Centre. This park development offers an excellent example of the manner in which the riverfront resources should be handled.



The pond in Acton public park is extensively used for swimming by the local residents and weekend picnickers from the surrounding urban centres.

CONCESSION

U.C.C. CONSERVATION AREA

LEGEND

- REFORESTED AREAS
- BUILDINGS

SCALE IN FEET
approx
0 900



CREDIT RIVER

COTTAGE

NORVAL HOUSE

BARN

UPPER CANADA HOUSE

ESQUEWING TWP

NORVAL

Credit

Branch

CULTIVATED

st
2

The total summer attendance at this camp is 400 to 450 children. Sixteen junior leaders and a staff of ten operate the camp during the height of the summer season. The average stay for each camper is about two weeks. Approximately 20 will remain for the two summer months. Fees are \$20 per week.

3. CAMP WESELKA

Camp Weselka is situated on a small tributary stream of the Credit about two miles east of Acton. Owned and operated by the Ukrainian Youth Association, it was first opened in the summer of 1954.

It is expected that in 1955 the camp will have a maximum capacity of 50. A total seasonal attendance of 180 is expected and approximately 80 per cent of the children will come from the Toronto area.

4. CAMP FOR JACK AND JILL

Opened in 1946, this children's camp is situated to the east of Highway No. 10 about two miles south of Caledon. The camp is unique since it is for young children between the ages of four and nine years.

The capacity of this camp is about 50 children in addition to leaders, kitchen staff and a nurse with a total seasonal attendance of about 100 and the average stay three to six weeks.

5. UPPER CANADA COLLEGE CAMP NORVAL

In 1912 the college purchased 500 acres of land on the outskirts of Norval with the intention of moving the institution to this site at a later date. Having abandoned the original plans for the property, it has been used since 1939 as a combined weekend recreation and nature study centre for the boarders attending the school in Toronto.

During the school term, boys are brought to the camp in groups of 10 or 15 for weekends commencing on Friday evening and ending on Sunday night. These trips offer the students an opportunity for wholesome outdoor recreation in the open countryside and provide a medium through which they may gain a first-hand knowledge of botany, zoology, agriculture and conservation. From the start reforestation has occupied a prominent position in the activities of the campers. Between 1939 and 1954 approximately 231,000 trees have been planted on the property.

During the winter months the valley slopes are suitable for skiing and tobogganing. Fortunately there is sufficient variation in gradients to satisfy the requirements of beginners as well as those who are more advanced in these sports.

6. CALEDON HILLS FARM, UNIVERSITY OF TORONTO

Situated on the Caledon Hills a few miles west of Inglewood, this 150-acre property was purchased in 1950 by Hart House, of the University of Toronto.

Originally the farm was intended to provide a centre for outdoor recreation and a medium whereby the students of the university could develop an appreciation of rural life and rural problems. As the project evolved it began to assume an increasingly important role as a conference centre for varsity clubs and academic groups.

Although it is difficult to determine accurately the number of people who use these facilities each year, it is certain that the number has steadily increased since the opening of the farm. During the 1954-55 season at least a thousand paying guests visited the site in addition to those attending the first Annual Winter Carnival.

CHAPTER 6
PUBLICLY OWNED PARKLANDS

There is a total of approximately 120 acres of publicly owned parkland within the confines of the Credit Watershed. These recreation areas are divided between the various municipalities in the proportions indicated in the following table:

<i>Public Parklands</i>	
Towns*.....	55 acres
Villages.....	45 acres
Townships.....	160 acres
TOTAL.....	260 acres

The combined population of the three towns lying wholly within the watershed is 10,577. In effect there are about 5.5 acres of public parkland for every 1,000 people living within these municipalities. Within the villages of the valley, which include Port Credit, Streetsville and Erin, there are approximately 4.5 acres of park per 1,000 population. The average for the villages is considerably depressed by the low acreage within Port Credit. However, the situation within this municipality shows signs of considerable improvement. When the Faulker Marsh property is converted into parkland at the completion of the sanitary fill operation, the recreation picture will be greatly improved with respect to riverfront parkland. The purchase of a 31-acre river valley park within the village of Streetsville is the most significant recreation development within the watershed in recent years and other municipalities would do well to follow this lead. The total parkland of the rural municipalities is 20 acres and this is composed of the fairgrounds at Caledon and a small community ball park at Inglewood.

CHAPTER 7
SCENIC ROUTE

It is recommended that the Credit Valley Conservation Authority establish a Scenic Route of about 62 miles in length running from the lakefront to Orangeville at the northern extremity of the watershed.

*Includes the parklands of Acton, Georgetown and Orangeville.

This route, illustrated on the map in the report, is intended to fulfil both a recreation and an educational function. Often it is impossible to combine these two functions satisfactorily in a single route because they differ considerably in their basic requirements. A scenic route primarily demands a scenic landscape, while a conservation trail must illustrate the physical pattern of the area and the conservation developments and problems related to various forms of land use. However, in this instance a union of the two may be feasible since the north-south scenic route through the most attractive sections of the valley fortunately crosses all the major physiographic formations and their characteristically associated forms of land use, because the latter tend to run in distinct east-west belts across the watershed. As there are obvious inter-relationships between recreation and education, this dual aspect enhances the general interest of the route.

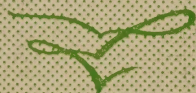
Approximately 62 per cent of the route can be classed as scenic when compared with the average landscape for the region. The scenic sections are of satisfactory length, quality and spacing to hold the interest of the motorist throughout the drive. The remaining mileage consists of linkage between these parts. In some instances, interesting conservation features are located along these stretches and this tends to compensate for the deterioration of scenic quality.

From the lakefront to a point above Glen Williams, the route traverses the level plains of the Lower Credit. The finest scenery of this area is associated with the deeply carved and relatively well-wooded valley of the main river and hence the route closely parallels or cuts across this feature. For a considerable distance the waters of the stream are in full view and the drive skirts a proposed conservation area between Meadowvale and Churchville. Special mention should be made of the colourful fields of flowers in the market gardens of the Huttonsville area at certain seasons of the year. North of Glen Williams the route climbs the escarpment from where there are some exceptionally fine views. The drive then descends from the limestone-capped ridge across the slopes of red shale into the main valley of the Credit River at Terra Cotta. It then follows the stream northward, passing a second conservation area recommended for development by the Authority. The route enters the proposed Credit Forks Multiple Use Conservation Area and then climbs the escarpment. From here there are superb vistas across the countryside. Passing by the falls at Belfountain and Cataract, the route leads northward across the rolling plains to the proposed North Caledon multiple-use conservation area near Alton. From there a spur extends northward to Orangeville.

It will be noted that the majority of the areas proposed for development by the Conservation Authority lie alongside this route which also passes through the proposed multiple-use development at the Credit Forks. Hence there will be ample, conveniently spaced picnic facilities along all parts of the drive.



CREDIT RIVER
WATERSHED



*For men may come
and men may go,
But I go on
forever.*

*The Brook
Alfred Lord Tennyson*